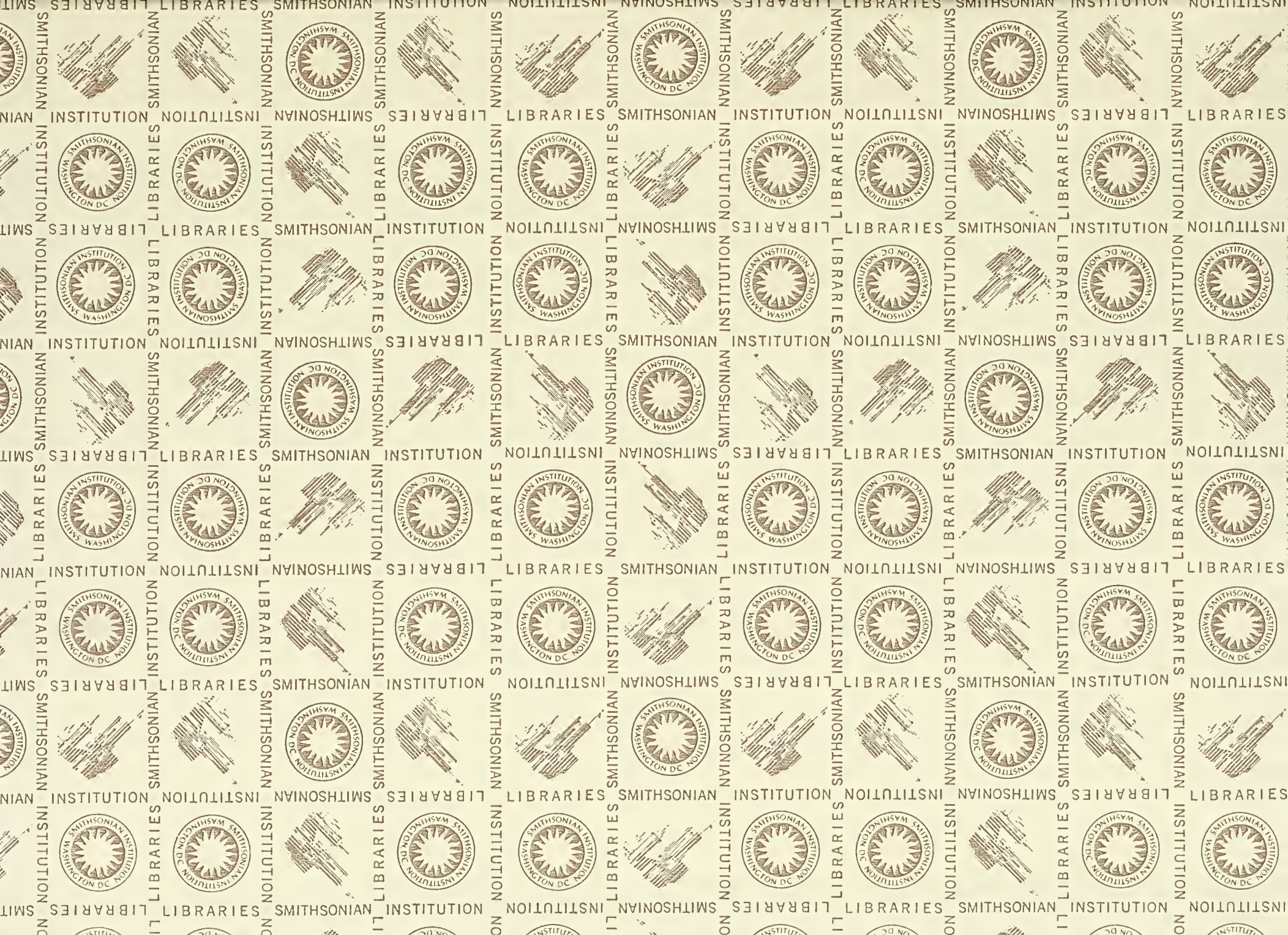
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A Scanning Electron Microscope Survey of the Epidermis of East African Grasses, V, and West African Supplement

PATRICIA G. PALMER
and
SUSAN GERBETH-JONES

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ABSTRACT

Palmer, Patricia G., and Susan Gerbeth-Jones. A Scanning Electron Microscope Survey of the Epidermis of East African Grasses, V, and West African Supplement. *Smithsonian Contributions to Botany*, number 67, 157 pages, 120 plates, 1988.—In developing a reference collection as a standard for using fossil grass cuticles as a paleoecological tool, we have examined leaf epidermal features of grasses with SEM. Descriptions (abaxial and adaxial surfaces) of 47 East African species are presented, comprising two tribes, Andropogoneae and Maydeae. Representative species of 13 genera found in tropical West Africa but not East Africa are described in the supplement.

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A Scanning Electron Microscope Survey of the Epidermis of East African Grasses, V, and West African Supplement

Patricia G. Palmer
and Susan Gerbeth-Jones

Introduction

This paper represents the conclusion of a survey of East African grasses and also includes a supplement describing representative species of genera found in tropical West Africa but not in East Africa. The purpose of this survey is to develop a reference collection of the micromorphological features of the leaves of modern grasses. The reference collection will provide a standard of comparison for identifying fossil leaf fragments that are abundant in African lake sediments (Palmer, 1976). As in earlier volumes of this survey (Palmer and Tucker, 1981, 1983; Palmer, Gerbeth-Jones, and Hutchison, 1985; Palmer and Gerbeth-Jones, 1986), we are examining the grass leaves with scanning electron microscopy (SEM). The reader should refer to the first volume (Palmer and Tucker, 1981) for discussion of terminology and illustrations of diagnostic features.

The East African section of this volume includes 47 genera representing two tribes: Andropogoneae and Maydeae. The West African supplement includes 13 species representing genera found in modern West Africa but not East Africa (Clayton, 1970, 1972, 1974, 1982).

We delimit East Africa to include Uganda, Kenya, and Tanzania, the region dealt with in the *Flora of Tropical East Africa* (Clayton, 1970, 1974, 1982). West Africa includes "all territories ... south of latitude 18°N and to the west of Lake Chad, and Fernando Po" as described in the *Flora of West Tropical Africa* (Clayton, 1972). We also follow the nomenclature used by Clayton in the Gramineae sections of *Flora of Tropical East Africa* and *Flora of West Tropical Africa.*

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MATERIALS AND METHODS.—Leaf material for scanning electron microscopy was taken from dried herbarium material. A section from the middle portion of a blade from an upper, mature, undamaged leaf was chosen for study. Wax was removed by soaking the specimen in xylene for 24 hours. Two pieces of the leaf (one exposing the abaxial or lower surface, the other exposing the adaxial or upper surface) were mounted on stubs with double-coated Scotch tape. The specimens were sputter-coated with gold-palladium, observed with a JEOL T20 or a Philips 501 scanning electron microscope, and photographed using Polaroid P/N 665 or P/N 55 film. The photomicrographs are deposited in the laboratory of D.A. Livingstone, Department of Zoology, Duke University.

Format for Species Descriptions

STOMATA.—Frequency; subsidiary cell shape; distribution; special features.

INTERSTOMATAL CELLS.—Shape; end walls; outline of walls. *Papillae:* Number/cell, distribution on each cell, shape, size.

Long Cells.—Shape; outline of walls. *Papillae:* Number/cell, distribution on each cell, shape, size.

Prickles.—Frequency; location and type.

Short Cells.—Location and distribution. *Silica Cells:* Location and frequency. *Cork Cells:* Location and frequency.

Silica Bodies.—Location and shape.

Microhairs.—Frequency; number of cells; shape; shape of apex.

Macrohairs.—Frequency; location; nature of base.

Special Features.—Description of unique features not covered in other categories.

Tribe Andropogoneae

Andropogon abyssinicus Fresenius

Plates 1, 2

Abaxial

Stomata.—Abundant; low-dome; 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 1*b,c*).

Interstomatal Cells.—Square, rectangular; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform (Plate 1*c*).

Long Cells.—Rectangular, long, narrow, width uniform and nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform (Plate 1*a,c*).

Prickles.—Infrequent; marginal prickles.

Short Cells.—Costal paired, >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 1*d,e*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 1*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex tapered (Plate 1*e*).

Macrohairs.—Abundant; intercostal; basal cells markedly raised (Plate 1*f*).

Adaxial

Stomata.—Infrequent; low-dome; 0 or 2 bands/intercostal zone, 1 row/band (Plate 2*b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 2*c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 2*a,c*).

Prickles.—Infrequent; marginal prickles; intercostal short macrohair-type prickles (Plate 2*a*).

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal not seen (Plate 2*d*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical (Plate 2*d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex tapered (Plate 2*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised. See Prickles (Plate 2*f*).

Andropterum stolzii (Pilger) C.E. Hubbard

Plates 3, 4

Abaxial

Stomata.—Common; low-dome or triangular (sometimes the deflated ones appear high-dome); 2 (?) stomatal bands/intercostal zone, 1 row/band. Some of the intercostal zones appear to be in deep grooves and distribution is not clear (Plate 3*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform or sometimes square; ends straight to convex or slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 3*a,b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 3*b,d*).

Prickles.—Abundant; costal and intercostal prickles (Plate 3*a,d*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal solitary or paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal infrequent (Plate 3*c,d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short, cross-shaped, nodular or sometimes crenate-vertical; intercostal crenate-vertical, cross-shaped (Plate 3*c,d*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 3*e*).

Macrohairs.—Common to abundant; intercostal and costal; basal cells markedly raised (Plate 3*f*).

Adaxial

Stomata.—Common; triangular or low-dome; 3 stomatal bands/intercostal zone, 2 rows/band. Stomata are sometimes in grooves and distribution is hard to determine (Plate 4*b,c*).

Interstomatal Cells.—Square to rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes the cell is slightly raised so as to resemble a papilla (Plate 4*c*).

Long Cells.—Rectangular or long, narrow, width uniform (on veins and marginal areas); markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 4*a,d*).

Prickles.—Abundant; costal and intercostal prickles (Plate 4*b*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 4*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends con-

cave to straight, middle wide, short; intercostal cross-shaped (Plate 4*d,e*).

Microhairs.—Common to abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 4*d,f*).

Macrohairs.—Common; intercostal and costal; basal cells markedly raised (Plate 4*a*).

Arthraxon lancifolius (Trinius) Hochstetter

Plates 5, 6

Abaxial

Stomata.—Abundant; low-dome or triangular but usually collapsed; 6 or 7 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 5*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width nonuniform (wider in middle) or appearing pentagonal when collapsed; ends straight to convex to slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. Papillae are usually collapsed. Sometimes there are 2 interstomatal cells between stomata (Plate 5*c*).

Long Cells.—Long, narrow, width uniform, nonuniform (wider in middle); markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. Papillae are usually collapsed (Plate 5*a,c,d*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal not seen (Plate 5*d,f*).

Silica Bodies.—Costal dumbbell, ends concave, middle wide, short; intercostal cross-shaped or dumbbell, ends concave, middle wide, short (Plate 5*d,f*).

Microhairs.—Infrequent; two-celled; basal and apical equal in length, medium; apex tapered (Plate 5*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised. There are two sizes of macrohairs (Plate 5*f*).

Adaxial

Stomata.—Infrequent; triangular; distribution is indeterminable because of infrequent stomata (Plate 6*b*).

Interstomatal Cells.—Long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 6*b*).

Long Cells.—Long, narrow, width uniform or appearing pentagonal or hexagonal when collapsed; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform. Sometimes papillae are located near one end of cell (Plate 6*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal not seen (Plate 6*c,d*).

Silica Bodies.—Costal nodular or dumbbell, ends concave, middle wide, short; intercostal crenate-vertical, narrowly cross-shaped to figure-eight (Plate 6*c,d*).

Microhairs.—Infrequent (marginal area only); two-celled; basal and apical equal in length, medium or basal shorter, apical slightly longer; apex rounded (Plate 6*e*).

Macrohairs.—Infrequent to common; intercostal; basal cells markedly raised (Plate 6*f*).

Capillipedium parviflorum (R. Brown) Stapf

Plates 7, 8

Abaxial

Stomata.—Abundant; low-dome or triangular; 3 or 4 stomatal bands/intercostal zone, 1 row/band. Sometimes the stomata are in shallow grooves with slightly overarching papillae (Plate 7*a,b*).

Interstomatal Cells.—Rectangular or sometimes square; ends slightly concave or indeterminable because of overarching papillae; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, paired or irregular, elongate, uniform (Plate 7*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, single row, globose, uniform (Plate 7*a,c*).

Prickles.—None seen.

Short Cells.—Costal paired or >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 7*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 7*d,e*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium or basal longer, apical slightly shorter; apex tapered (Plate 7*e*).

Macrohairs.—Abundant; costal; basal cells absent or present and markedly raised (Plate 7*f*).

Adaxial

Stomata.—Infrequent; low-dome to triangular; distribution indeterminable because of infrequent stomata (Plate 8*b*).

Interstomatal Cells.—Long, narrow, width uniform; ends straight or indeterminable because of overarching papillae; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, paired or irregular, elongate, uniform (Plate 8*b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 3 or more/cell, single row, globose, uniform. There are bands of wide nonpapillate long cells (Plate 8*b,c*).

Prickles.—Common; costal and intercostal prickles and short macrohair-type prickles (Plate 8*a,f*).

Short Cells.—Costal paired, 3–5/row or >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 8*c,d*).

Silica Bodies.—Costal cross-shaped, nodular or dumbbell, ends rounded, straight, sometimes knobbed or concave, middle

short or long, wide; intercostal cross-shaped (Plate 8*c,d*).

Microhairs.—Common; two-celled; basal longer, apical slightly shorter; apex tapered (Plate 8*e*).

Macrohairs.—Abundant; costal and intercostal; basal cells slightly to markedly raised. See Prickles (Plate 8*a,f*).

Chrysopogon plumulosus Hochstetter

Plates 9, 10

Abaxial

Stomata.—Common; triangular or sometimes low-dome; 1 or sometimes 2 stomatal bands/intercostal zone, 1 row/band. The costal zones are very wide. Some of the costal zones consist of raised long cells that are wider and shorter than the regular long cells (Plate 9*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are two interstomatal cells and a silica cell between stomata (Plate 9*a,c*).

Long Cells.—Long, narrow, width uniform or rectangular in raised costal areas; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 9*a,b*).

Prickles.—Common; intercostal prickles, costal and intercostal short macrohair-type prickles (Plate 9*c*).

Short Cells.—Costal solitary (silica cells only), paired; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal infrequent; intercostal not seen (Plate 9*c–e*).

Silica Bodies.—Costal cross-shaped, crenate-vertical or dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 9*c–e*).

Microhairs.—Infrequent; two-celled; basal shorter, apical slightly longer; apex rounded (Plate 9*f*).

Macrohairs.—Common to abundant; intercostal and costal; basal cells slightly raised. See Prickles (Plate 9*a,c*).

Adaxial

Stomata.—Common; triangular or sometimes low-dome; 1 or sometimes 2 stomatal bands/intercostal zone, 1 row/band (Plate 10*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 10*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 10*c,d*).

Prickles.—Abundant; costal and intercostal short macrohair-type prickles (Plate 10*a,f*).

Short Cells.—Costal solitary (silica cells only), paired; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal infrequent; intercostal not seen (Plate 10*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight or concave, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 10*c,d*).

Microhairs.—Infrequent to common; two-celled; basal shorter, apical longer; apex rounded (Plate 10*e*).

Macrohairs.—Abundant; costal and intercostal; basal cells slightly raised or absent. See Prickles (Plate 10*e,f*).

Cleistachne sorghoides Bentham

Plates 11, 12

Abaxial

Stomata.—Common to abundant; triangular or sometimes low-dome; 1 or 2 stomatal bands/intercostal zone, 3–5 rows/band (Plate 11*a,b*).

Interstomatal Cells.—Square, rectangular; ends markedly concave; outline of walls indeterminable. *Papillae:* 1/cell, globose, uniform. The papilla is very large covering most of the cell and is sometimes located near one end of cell. Sometimes there are two interstomatal cells between stomata (Plate 11*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised (?). *Papillae:* None seen. Some cells have raised areas resembling papillae (Plate 11*c,e*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 11*d,e*).

Silica Bodies.—Costal nodular or dumbbell, ends straight, or concave, middle short, wide; intercostal cross-shaped or dumbbell, ends concave, middle wide, short (Plate 11*d,e*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium and basal shorter, apical longer; apex tapered (Plate 11*f*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 11*a*).

Adaxial

Stomata.—Common; low-dome or triangular; 6 or 7 stomatal bands/intercostal zone, 1 row/band. Intercostal zone is very wide (Plate 12*a,b*).

Interstomatal Cells.—Square to rectangular; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes cell is raised to resemble a papilla (Plate 12*a,d*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen. Some cells have raised areas resembling papillae (Plate 12*a,e*).

Prickles.—Infrequent; intercostal prickles (Plate 12*a*).

Short Cells.—Costal >5/row; intercostal solitary (silica cellsonly), paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 12*c,d*).

Silica Bodies.—Costal dumbbell, ends rounded to straight to convex, middle long, narrow; intercostal crenate-vertical, cross-shaped, dumbbell, ends straight, middle wide, short (Plate 12*c,d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 12*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 12*f*).

Coelorhachis afraurita (Stapf) Stapf

Plates 13, 14

Abaxial

Stomata.—Common to abundant; low-dome; 3 or 4 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 13*b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen, cell raised, or 1/cell, globose, uniform. There are sometimes 2 interstomatal cells and a silica body between stomata (Plate 13*c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen, cell raised, or 1/cell, globose, uniform (Plate 13*a,c,f*).

Prickles.—None seen.

Short Cells.—Costal solitary, paired, 2–5/row; intercostal solitary, paired (?). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common (Plate 13*d,e*).

Silica Bodies.—Costal cross-shaped, crenate-vertical, dumbbell, ends rounded, middle wide, very short; intercostal cross-shaped (Plate13*d,e*).

Microhairs.—Common to abundant; two-celled; basal and apical equal in length, medium or basal shorter, apical slightly longer; apex rounded (Plate 13*f*).

Macrohairs.—None seen.

Special Features.—Irregular horizontal striations occur on interstomatal and long cells. These striations may be artifacts of drying (Plate 13*f*).

Adaxial

Stomata.—Common; low-dome; 3 or 4 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 14*b*).

Interstomatal Cells.—Rectangular; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen, cell raised, or 1/cell, globose, uniform. Sometimes there are 2 interstomatal cells and a silica body between stomata (Plate 14*a,c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen, cell raised, or 1/cell, globose, uniform (Plate 14*a,c*).

Prickles.—None seen.

Short Cells.—Costal solitary, paired, 3–5/row; intercostal solitary. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal abundant (Plate 14*d,e*).

Silica Bodies.—Costal crenate-vertical, cross-shaped, dumbbell, ends rounded, middle wide, very short; intercostal crenate-vertical, cross-shaped (Plate 14*d,e*).

Microhairs.—Common; two-celled; basal longer, apical slightly shorter; apex rounded (Plate 14*f*).

Macrohairs.—None seen.

Special Features.—Irregular horizontal striations occur on interstomatal and long cells (Plate 14*f*).

Cymbopogon nardus (Linnaeus) Rendle

Plates 15, 16

Abaxial

Stomata.—Common to abundant; low-dome to triangular; 1 or 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 15*a–c*).

Interstomatal Cells.—Square to rectangular; ends slightly concave or straight to convex; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or sometimes cell raised. There are often 2 interstomatal cells between stomata (Plate 15*a–c*).

Long Cells.—Rectangular, long, narrow, width uniform, or sometimes square; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 15*c*).

Prickles.—Common to abundant; costal and intercostal prickles (Plate 15*a*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary (cork cells only). *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal and intercostal common (Plate 15*c–f*).

Silica Bodies.—Costal cross-shaped, nodular, dumbbell, ends straight or rounded, middle wide, short; intercostal not seen (Plate 15*d,e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 15*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent to common; low-dome, high-dome to triangular; 2 stomatal bands/intercostal zone, 1 row/band. The stomatal rows are adjacent to veins with a wide intercostal zone lacking stomata (Plate 16*b,c*).

Interstomatal Cells.—Square, rectangular, long, narrow, width uniform; ends straight to convex, slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen, cell slightly raised, or 1/cell, globose, uniform. Sometimes there are two inerstomatal cells between stomata (Plate 16*b,c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 16*a,c*).

Prickles.—Infrequent to common; costal prickles (Plate 16*a*).

Short Cells.—Costal solitary (cork cells only), paired,

3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 16*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 16*d,e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 16*f*).

Macrohairs.—None seen.

Dichanthium annulatum (Forsskål) Stapf

Plates 17, 18

Abaxial

Stomata.—Abundant; low-dome or sometimes high-dome (?); 1 stomatal band/intercostal zone, 1 row/band. Stomata are sunken in grooves and sometimes obscured by overarched papillae (Plate 17*b,c*).

Interstomatal Cells.—Square to rectangular; ends straight to convex; outline of walls obscured by large papillae. *Papillae:* 1/cell, globose, uniform. Papillae are very large and inflated (Plate 17*b,c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking raised. *Papillae:* None seen, 1/cell, 3 or more/cell, globose, uniform (Plate 17*c–e*).

Prickles.—Infrequent; costal prickles (Plate 17*b*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal not seen (Plate 17*d,e*).

Silica Bodies.—Costal nodular and dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 17*d,e*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex tapered (Plate 17*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 17*f*).

Adaxial

Stomata.—Common; triangular; 1 or 2 stomatal bands/intercostal zone, 1 row/band (Plate 18*b,c*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking raised. *Papillae:* None seen or 1/cell, globose, uniform. Papillae are located near one end of cell. There are sometimes two interstomatal cells between stomata (Plate 18*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 18*a,b*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 18*c*).

Short Cells.—Costal >5/row or sometimes paired; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal not seen (Plate 18*b,d*).

Silica Bodies.—Costal dumbbell, ends concave to straight, middle wide, short or occasionally nodular, cross-shaped; intercostal cross-shaped, crenate-vertical (Plate 18*b,d*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex tapered (Plate 18*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 18*a,f*).

Diheteropogon amplectens var. *catangensis* (Chiovenda) W.D. Clayton

Plates 19, 20

Abaxial

Stomata.—Abundant; low-dome; 1 or 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 19*b,c*).

Interstomatal Cells.—Long, narrow, width uniform or nonuniform (probably an artifact of collapsed cells); ends straight to convex; markedly sinuous, interlocking raised. *Papillae:* None seen or 1/cell, globose, uniform (sometimes deflated) or cell raised (Plate 19*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 19*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 19*d,e*).

Silica Bodies.—Costal nodular or dumbbell, ends straight, middle wide, short; intercostal square, tall and narrow, crenate-vertical, cross-shaped (Plate 19*d,e*).

Microhairs.—Abundant; two-celled; basal and apical equal in length, medium and basal longer, apical shorter; apex rounded (Plate 19*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—None seen.

Long Cells.—Rectangular, long, narrow, width uniform or nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 20*a,d*).

Prickles.—Infrequent; intercostal prickles (Plate 20*e*).

Short Cells.—Costal >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal and intercostal common (Plate 20*b–d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal crenate-vertical (Plate 20*b–d*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium and basal longer, apical shorter; apex rounded (Plate 20*f*).

Macrohairs.—None seen.

Elionurus tripsacoides Willdenow

PLATES 21, 22

ABAXIAL

STOMATA.—Common; low-dome; 4 stomatal bands/intercostal zone, 1 row/band (Plate 21*b,c*).

INTERSTOMATAL CELLS.—Rectangular, long, narrow, width uniform and nonuniform; ends straight to convex; nonsinuous. *Papillae:* None seen or 1/cell (deflated) (?). Papilla located near one end of cell (Plate 21*b,c*).

LONG CELLS.—Rectangular, long, narrow, width uniform and nonuniform; nonsinuous. *Papillae:* None seen or 1/cell (deflated) (?). Papilla located near one end of cell (Plate 21*a,c*).

PRICKLES.—Abundant; costal and intercostal prickles; intercostal hooks (Plate 21*a,c*).

SHORT CELLS.—Costal solitary, paired; intercostal not seen. *Silica Cells:* Costal infrequent; intercostal not seen. *Cork Cells:* Costal infrequent; intercostal not seen. Cork cells are sometimes papillate (Plate 21*b,d,e*).

SILICA BODIES.—Costal elliptical, cross-shaped; intercostal not seen (Plate 21*d,e*).

MICROHAIRS.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 21*f*).

MACROHAIRS.—None seen.

ADAXIAL

STOMATA.—Infrequent; low-dome to triangular; 2 stomatal bands/intercostal zone, 1 row/band (Plate 22*b,c*).

INTERSTOMATAL CELLS.—Long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 22*b,c*).

LONG CELLS.—Long, narrow, width uniform and nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 22*a,b*).

PRICKLES.—Infrequent; costal prickles (Plate 22*d*).

SHORT CELLS.—Costal solitary, paired, sometimes 3–5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 22*a,c–e*).

SILICA BODIES.—Costal crenate-vertical, tall and narrow, cross-shaped; intercostal crenate-vertical, tall and narrow (Plate 22*a,c–e*).

MICROHAIRS.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 22*f*).

MACROHAIRS.—None seen.

Elymandra grallata (Stapf) W.D. Clayton

PLATES 23, 24

ABAXIAL

STOMATA.—Common to abundant; low-dome to triangular; 1 or sometimes 2 stomatal bands/intercostal zone, 1 row/band. Subsidiary cells sometimes have a pair of papillae (Plate 23*b,c*).

INTERSTOMATAL CELLS.—Square to rectangular; ends straight to convex; nonsinuous. *Papillae:* None seen or 1/cell, globose, uniform (whole cell appears raised). Papillae are located near center of cell (Plate 23*c*).

LONG CELLS.—Rectangular to long, narrow, width uniform; nonsinuous (outline of walls difficult to determine). *Papillae:* None seen (Plate 23*a,c*).

PRICKLES.—Common to abundant; intercostal and sometimes costal prickles (Plate 23*e*).

SHORT CELLS.—Costal >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 23*d,e*).

SILICA BODIES.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 23*d,e*).

MICROHAIRS.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 23*f*).

MACROHAIRS.—None seen.

ADAXIAL

STOMATA.—None seen.

LONG CELLS.—Rectangular, long, narrow, width uniform; nonsinuous. *Papillae:* None seen (Plate 24*a,b*).

PRICKLES.—Abundant; costal and sometimes intercostal prickles (Plate 24*a,f*).

SHORT CELLS.—Costal solitary (silica cells only), paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 24*c–e*).

SILICA BODIES.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 24*c–e*).

MICROHAIRS.—None seen.

MACROHAIRS.—None seen.

Eriochrysis pallida Munro

PLATES 25, 26

ABAXIAL

STOMATA.—Common; low-dome to triangular; 3 or 4 stomatal bands/intercostal zone, 1 or 2 rows/band. Costal zones are difficult to detect (Plate 25*b,c*).

INTERSTOMATAL CELLS.—Rectangular; ends slightly concave; cell walls indeterminable. *Papillae:* 1/cell, globose, uniform (Plate 25*c*).

LONG CELLS.—Rectangular, long, narrow, width uniform and nonuniform; cell walls indeterminable. *Papillae:* 1/cell, globose, uniform (Plate 25*a,c*).

PRICKLES.—Infrequent; intercostal prickles.

SHORT CELLS.—Costal and/or intercostal solitary, paired. *Silica Cells:* Costal and intercostal infrequent. *Cork Cells:* Costal and intercostal infrequent (Plate 25*d,e*).

SILICA BODIES.—Costal and/or intercostal crenate-vertical, narrowly saddle-shaped, cross-shaped. Costal zone is indeterminable (Plate 25*d,e*).

MICROHAIRS.—None seen.

Macrohairs.—Abundant; intercostal; basal cells markedly raised. Few macrohair shafts are present, but what appears to be basal cells of macrohairs with the shaft broken off are abundant (Plate 25*f*).

Adaxial

Stomata.—Abundant; triangular, high-dome; distribution indeterminable because costal areas are not distinguishable (Plate 26*b*).

Interstomatal Cells.—Rectangular; ends slightly concave; slightly sinuous. *Papillae:* 1/cell, globose, uniform. Papillae are often collapsed. Sometimes there are several interstomatal cells between stomata (Plate 26*b*).

Long Cells.—Rectangular, long, narrow, width uniform; nonsinuous to slightly sinuous. *Papillae:* None seen or 1/cell, globose, uniform (Plate 26*a,c*).

Prickles.—Infrequent; intercostal short macrohair-type prickles (?) (Plate 26*c*).

Short Cells.—Costal and intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common. Costal zones are difficult to determine (Plate 26*d*).

Silica Bodies.—Costal and intercostal crenate-vertical, narrowly saddle-shaped, cross-shaped (Plate 26*d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 26*e*).

Macrohairs.—Abundant; intercostal (?); basal cells slightly raised. See Prickles (Plate 26*f*).

Euclasta condylotricha (Steudel) Stapf

Plates 27, 28

Abaxial

Stomata.—Abundant; low-dome or sometimes appearing parallel because of collapsed cells; 1–3 stomatal bands/intercostal zone, 1 row/band (Plate 27*b,c*).

Interstomatal Cells.—Square to rectangular; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. Sometimes there are two interstomatal cells between stomata. Papillae are usually deflated (Plate 27*a,c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 27*c,d*).

Prickles.—Common; costal prickles and intercostal hooks (Plate 27*d*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 27*d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short, or sometimes nodular; intercostal not seen. Sometimes silica bodies are adjacent (Plate 27*d*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex tapered (Plate 27*e*).

Macrohairs.—Abundant; intercostal; basal cells markedly raised (Plate 27*f*).

Adaxial

Stomata.—Infrequent; low-dome to triangular. Stomata are seen only near margin and are too infrequent to determine distribution (Plate 28*b*).

Interstomatal Cells.—None seen.

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 28*a,c*).

Prickles.—Common; costal prickles and short macrohair-type prickles; intercostal hooks (Plate 28*a,c,f*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 28*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 28*d,e*).

Microhairs.—None seen.

Macrohairs.—See Prickles.

Eulalia villosa (Thunberg) Nees

Plates 29, 30

Abaxial

Stomata.—Infrequent (seen near margin only); low-dome; distribution indeterminable (Plate 29*b*).

Interstomatal Cells.—None seen.

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 29*a,c*).

Prickles.—Common; intercostal prickles and hooks (Plate 29*c*).

Short Cells.—Costal solitary (cork cells only), 3–5/row, >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 29*c,d*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle narrow, short; intercostal cross-shaped (Plate 29*c,d*).

Microhairs.—Abundant; two-celled; basal and apical equal in length, medium and basal shorter, apical longer; apex rounded (Plate 29*e*).

Macrohairs.—Abundant; intercostal; basal cells markedly raised (Plate 29*f*).

Adaxial

Stomata.—Abundant; low-dome; 1–4 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 30*b,c*).

Interstomatal Cells.—Square, rectangular to long, narrow, width uniform or nonuniform (probably an artifact from collapsed cells); ends straight to convex; nonsinuous. *Papillae:* None seen or 1/cell (often deflated). Sometimes there are 2 interstomatal cells between stomata (Plate 30*c*).

Long Cells.—Long, narrow, width uniform or nonuniform

(possibly an artifact from collapsed cells); nonsinuous. *Papillae:* None seen (Plate 30*a,c*).

Prickles.—Common; intercostal prickles and hooks (Plate 30*b,c*).

Short Cells.—Costal >5/row; intercostal solitary (cork cells only). *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal infrequent. Cork cells are papillate (Plate 30*c,d*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle narrow, short; intercostal not seen (Plate 30*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 30*e*).

Macrohairs.—Abundant; intercostal; basal cells markedly raised (Plate 30*f*).

Exotheca abyssinica (A. Richard) Andersson

Plates 31, 32

Abaxial

Stomata.—Abundant; low-dome to triangular; 1 or sometimes 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 31*a,b*).

Interstomatal Cells.—Square or sometimes rectangular; ends straight to convex to slightly concave; outline of walls indeterminable. *Papillae:* None seen. Cells are sometimes raised to resemble papillae (Plate 31*c*).

Long Cells.—Long, narrow, width uniform or sometimes rectangular; outline of walls indeterminable. *Papillae:* None seen (Plate 31*c,d*).

Prickles.—Abundant; costal and intercostal prickles; intercostal hooks (Plate 31*d*).

Short Cells.—Costal solitary, paired, 3–5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 31*e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 31*e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex tapered (Plate 31*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome to triangular; stomata too infrequent to determine distribution. Stomata are common in narrow zone near the margin (Plate 32*b*).

Interstomatal Cells.—Square to rectangular to long, narrow, width uniform; ends straight to convex to slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 32*b*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 32*a*).

Prickles.—Common; costal prickles and short macrohair-type prickles; intercostal prickles and hooks (Plate 32*a*).

Short Cells.—Costal solitary, paired, 3–5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal infrequent. *Cork Cells:* Costal and intercostal infrequent (Plate 32*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends concave, middle wide, short; intercostal cross-shaped, crenate-vertical (Plate 32*c,d*).

Microhairs.—Infrequent; two-celled; basal longer, apical shorter; apex tapered (Plate 32*e*).

Macrohairs.—Common; costal; basal cells slightly raised. Some of the macrohairs are extremely long and are intertwined in pairs. (See Prickles) (Plate 32*a,f*).

Hackelochloa granularis (Linnaeus) Kuntze

Plates 33, 34

Abaxial

Stomata.—Common; low-dome to triangular; 4 or 5 stomatal bands/intercostal zone, 1 row/band (Plate 33*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are 2 interstomatals and a silica cell between stomata (Plate 33*a*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 33*a,e*).

Prickles.—Infrequent; marginal prickles only.

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal abundant; intercostal not seen. Sometimes the silica cells are adjacent (Plate 33*c,d*).

Silica Bodies.—Costal cross-shaped (often narrowly), dumbbell, ends concave, middle wide, short; intercostal crenate-vertical, cross-shaped (often narrowly) (Plate 33*a,d*).

Microhairs.—Infrequent to common; two-celled; basal shorter, apical longer; apex tapered (Plate 33*e*).

Macrohairs.—Common; costal and intercostal; basal cells markedly raised (Plate 33*f*).

Adaxial

Stomata.—Common; triangular; 6 or 7 stomatal bands/intercostal zone, 1 row/band (Plate 34*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends markedly or sometimes slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 34*a*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 34*a,e*).

Prickles.—Infrequent; marginal prickles only.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen. Sometimes silica cells are adjacent (Plate 34*c,d*).

Silica Bodies.—Costal cross-shaped or dumbbell, ends concave or straight, middle wide, short; intercostal crenate-vertical, cross-shaped (sometimes narrowly), or sometimes

figure-eight (Plate 34*a,c,d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 34*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 34*f*).

Hemarthria natans Stapf

Plates 35, 36

Abaxial

Stomata.—Abundant; low-dome to triangular; 8–12 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 35*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 35*b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 35*b*).

Prickles.—None seen.

Short Cells.—Costal >5/row, 3–5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 35*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends concave, middle wide, short; intercostal cross-shaped, crenate-vertical (Plate 35*c,d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 35*e*).

Macrohairs.—Common; intercostal and costal; basal cells markedly raised. The shaft of the macrohair is flattened and twisted (Plate 35*f*).

Adaxial

Stomata.—Common; low-dome to triangular; 6–8 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 36*a,b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends markedly to slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 36*a,b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 36*a*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 36*a*).

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal infrequent (Plate 36*c,d*).

Silica Bodies.—Costal dumbbell, ends rounded to concave, middle wide, short; intercostal crenate-vertical (Plate 36*c,d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 36*e*).

Macrohairs.—Common; intercostal and costal; basal cells markedly raised. Shaft of macrohair is flattened and twisted (Plate 36*f*).

Heteropholis sulcata (Stapf) C.E. Hubbard

Plates 37, 38

Abaxial

Stomata.—Abundant; triangular; 7–10 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 37*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 37*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 37*a,c*).

Prickles.—None seen.

Short Cells.—Costal solitary, paired, 3–5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 37*d,e*).

Silica Bodies.—Costal cross-shaped; intercostal crenate-vertical to cross-shaped (Plate 37*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 37*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome, triangular; 5–7 stomatal bands/intercostal zone, 1 row/band (Plate 38*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. (Plate 38*b,c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 38*a,b*).

Prickles.—None seen.

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal common; intercostal infrequent (Plate 38*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends rounded, middle wide, short; intercostal cross-shaped to crenate-vertical (Plate 38*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 38*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 38*f*).

Heteropogon melanocarpus (Elliott) Bentham

Plates 39, 40

Abaxial

Stomata.—Abundant; low-dome to triangular to high-dome; 1 stomatal band/intercostal zone, 1 row/band (Plate 39*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width

uniform; ends straight to convex; nonsinuous (?). *Papillae:* 1/cell (at times compound) or 3 or more/cell, single row, elongate, variable (Plate 39*a,c*).

Long Cells.—Long, narrow, width uniform; nonsinuous, markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, single row, elongate, uniform (Plate 39*a*).

Prickles.—Common; costal prickles (Plate 39*a,f*).

Short Cells.—Costal paired, 3–5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 39*a,d*).

Silica Bodies.—Costal nodular or dumbbell, ends rounded, middle narrow, short; intercostal not seen (Plate 39*d*).

Microhairs.—Infrequent; two-celled; basal and apical equal in length, long or basal longer, apical shorter; apex tapered (Plate 39*e*).

Macrohairs.—None seen.

Adaxial

Stomata.—None seen.

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, flat. *Papillae:* None seen or 3 or more/cell, single row, elongate, uniform (Plate 40*a,b*).

Prickles.—Costal common; intercostal infrequent (Plate 40*a,f*).

Short Cells.—Costal paired, 3–5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 40*a,d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 40*c,d*).

Microhairs.—Infrequent; two-celled; basal and apical equal in length, medium or basal longer, apical shorter; apex tapered (Plate 40*e*).

Macrohairs.—None seen.

Homozeugos eylesii C.E. Hubbard

Plates 41, 42

Abaxial

Stomata.—Common to abundant; low-dome to triangular; 1 stomatal band/intercostal zone, 1 row/band (Plate 41*a–c*).

Interstomatal Cells.—Square to rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform (Plate 41*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 41*b,c,e*).

Prickles.—Abundant; costal and intercostal prickles (Plate 41*d,e*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 41*d–f*).

Silica Bodies.—Costal dumbbell, ends rounded to straight, middle wide, short; intercostal not seen (Plate 41*d–f*).

Microhairs.—Common; two-celled; basal shorter, apical slightly longer; apex tapered (Plate 41*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent to common; low-dome to triangular; 1 or sometimes 2 stomatal bands/intercostal zone, 1 row/band. Some intercostal zones have no stomata (Plate 42*b,c*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 42*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 42*c,d*).

Prickles.—Common; costal prickles; intercostal hooks (Plate 42*d,f*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common to abundant; intercostal not seen. *Cork Cells:* Costal common to abundant; intercostal not seen (Plate 42*d,f*).

Silica Bodies.—Costal dumbbell, ends rounded to straight, middle wide, short; intercostal not seen (Plate 42*d,f*).

Microhairs.—Common; two-celled; basal and apical equal in length, long or basal shorter, apical slightly longer; apex tapered (Plate 42*e*).

Macrohairs.—Infrequent; intercostal; basal cells slightly raised (Plate 42*f*).

Hyparrhenia bracteata (Willdenow) Stapf

Plates 43, 44

Abaxial

Stomata.—Abundant; low-dome; 1 stomatal band/intercostal zone, 1 row/band. Subsidiary cells sometimes have a pair of papillae (Plate 43*b,d*).

Interstomatal Cells.—Square; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform (Plate 43*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 43*c*).

Prickles.—Abundant; costal prickles; intercostal hooks (Plate 43*a,c*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 43*c,d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short, or sometimes cross-shaped; intercostal not seen (Plate 43*c,d*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 43*e*).

Macrohairs.—Abundant; costal; basal cells slightly raised (Plate 43*a,f*).

ADAXIAL

STOMATA.—Abundant; low-dome; 2 stomatal bands/intercostal zone, 1 row/band (Plate 44*b*).

INTERSTOMATAL CELLS.—Square, rectangular; ends straight to slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. There are sometimes two interstomatal cells between stomata (Plate 44*a–c*).

LONG CELLS.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 44*a,b*).

PRICKLES.—Common; costal prickles; intercostal hooks (Plate 44*a,b*).

SHORT CELLS.—Costal paired, 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal not seen (Plate 44*c,d*).

SILICA BODIES.—Costal dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 44*c,d*).

MICROHAIRS.—Abundant; two-celled; basal and apical equal in length, medium; apex tapered (Plate 44*e*).

MACROHAIRS.—Abundant; costal; basal cells slightly raised (Plate 44*f*).

Hyperthelia dissoluta (Steudel) W.D. Clayton

PLATES 45, 46

ABAXIAL

STOMATA.—Abundant; low-dome, triangular; 1 stomatal band/intercostal zone, 1 row/band (Plate 45*b,c*).

INTERSTOMATAL CELLS.—Square to rectangular; ends straight to convex, slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose to elongate, uniform. Papillae are very large and often appear deflated (Plate 45*b,c*).

LONG CELLS.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose to elongate, uniform. Papillae are very large, often appear deflated, and are located either near one end of cell or in center (Plate 45*a,d*).

PRICKLES.—Abundant; costal short macrohair-type prickles; intercostal prickles and hooks (Plate 45*b*).

SHORT CELLS.—Costal solitary (silica cells only), paired, >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 45*b–d*).

SILICA BODIES.—Costal dumbbell, ends rounded, middle wide, short, cross-shaped; intercostal not seen (Plate 45*b–d*).

MICROHAIRS.—Common; two-celled; basal longer, apical shorter; apex tapered (Plate 45*e*).

MACROHAIRS.—Abundant; costal; basal cells absent. (See Prickles) (Plate 45*a,f*).

ADAXIAL

STOMATA.—Infrequent; low-dome, triangular; distribution indeterminable (Plate 46*b*).

INTERSTOMATAL CELLS.—Long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose to elongate, uniform. Papillae are very large and appear deflated (Plate 46*b,c*).

LONG CELLS.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 46*a,c*).

PRICKLES.—Abundant; costal prickles and short macrohair-type prickles; intercostal prickles and hooks (Plate 46*b,d,f*).

SHORT CELLS.—Costal 3–5/row, >5/row; intercostal paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 46*c,d*).

SILICA BODIES.—Costal dumbbell, ends straight, middle narrow or wide, short, sometimes cross-shaped; intercostal cross-shaped (Plate 46*c,d*).

MICROHAIRS.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 46*e*).

MACROHAIRS.—Abundant; costal and intercostal short macrohair-type prickles; basal cells absent. See Prickles (Plate 46*f*).

Imperata cylindrica (Linnaeus) Raeuschel

PLATES 47, 48

ABAXIAL

STOMATA.—Common; low-dome to triangular; 1 stomatal band/intercostal zone, 2 rows/band. Most subsidiary cells have a pair of papillae. Sometimes papillae are only slightly raised (Plate 47*b,c*).

INTERSTOMATAL CELLS.—Rectangular to long, narrow, width uniform or sometimes square; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 47*c*).

LONG CELLS.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 47*a,c*).

PRICKLES.—Infrequent to common; intercostal prickles (Plate 47*a,c*).

SHORT CELLS.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal and intercostal common (Plate 47*d,e*).

SILICA BODIES.—Costal nodular or dumbbell, ends straight or lobed, middle wide, short; intercostal cross-shaped (Plate 47*d,e*).

MICROHAIRS.—Common; two-celled; basal shorter, apical slightly longer to basal and apical equal in length, medium; apex tapered (Plate 47*f*).

MACROHAIRS.—None seen.

ADAXIAL

STOMATA.—Common; triangular; 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band. Each subsidiary cell appears to have a pair of collapsed papillae (Plate 48*b,c*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* None seen (in zones near the margin and near the midvein) or 3 or more/cell, single row, globose, uniform (Plate 48*a,c,f*).

Long Cells.—Rectangular or long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (in zones near the margin and near the midvein) or 3 or more/cell, single row, globose, uniform (Plate 48*a,d,f*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 48*d,f*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 48*d,e*).

Silica Bodies.—Costal dumbbell, ends straight or lobed, middle wide, short; intercostal not seen (Plate 48*d,e*).

Microhairs.—Infrequent to common; two-celled; basal longer, apical shorter to basal and apical equal in length, medium; apex tapered (Plate 48*d,f*).

Macrohairs.—None seen.

Ischaemum afrum (J.F. Gmelin) Dandy

Plates 49, 50

Abaxial

Stomata.—Abundant; low-dome to triangular; 1 stomatal band/intercostal zone, 1 or sometimes 2 rows/band (Plate 49*a,b*).

Interstomatal Cells.—Square to rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 49*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 49*a,c*).

Prickles.—Common to abundant; costal prickles and intercostal hooks (Plate 49*d*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary, paired. *Silica Cells:* Costal common to abundant; intercostal common. *Cork Cells:* Costal common to abundant; intercostal common (Plate 49*c–e*).

Silica Bodies.—Costal dumbbell, ends straight or rounded, middle wide, short or long; intercostal tall and narrow, cross-shaped, square (Plate 49*c–e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex tapered (Plate 49*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Common; low-dome to triangular; 1 or sometimes 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 50*a,b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 50*c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 50*a,d*).

Prickles.—Infrequent to common; costal prickles and intercostal hooks (Plate 50*a*).

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 50*c–e*).

Silica Bodies.—Costal dumbbell, ends rounded or straight, middle wide, long or short; intercostal tall and narrow, narrowly saddle-shaped, cross-shaped (Plate 50*c–e*).

Microhairs.—Infrequent to common; two-celled; basal longer, apical shorter; apex tapered (Plate 50*f*).

Macrohairs.—None seen.

Loxodera caespitosa (C.E. Hubbard) Simon

Plates 51, 52

Abaxial

Stomata.—Abundant; high-dome (?); 2 or 3 stomatal bands/intercostal zone, 1 or 2 rows/band. Stomata are somewhat obscured by large papillae, and shape of the subsidiary cell is difficult to determine (Plate 51*a–c*).

Interstomatal Cells.—Square or sometimes rectangular; ends straight to convex; outline of walls indeterminable. *Papillae:* 1/cell, globose, uniform (Plate 51*c*).

Long Cells.—Rectangular, long, narrow, width nonuniform (wider in middle); outline of walls indeterminable. *Papillae:* None seen or 1/cell, globose, uniform. Cells adjacent to stomata are often papillate (Plate 51*a,f*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 51*d,e*).

Silica Bodies.—Costal dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 51*d,e*).

Microhairs.—Abundant; two-celled; basal and apical equal in length, short; apex rounded (Plate 51*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome to triangular; distribution indeterminable because stomata too infrequent (Plate 52*b*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 52*a,c*).

Prickles.—Infrequent; costal prickles (Plate 52*c*).

Short Cells.—Costal paired, 3–5/row; intercostal solitary (silica cells only) or paired. *Silica Cells:* Costal infrequent;

intercostal common. *Cork Cells:* Costal and intercostal infrequent (Plate 52*d,e*).

Silica Bodies.—Costal cross-shaped or dumbbell, ends concave, middle wide, short; intercostal crenate-vertical (Plate 52*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical slightly longer; apex rounded (Plate 52*f*).

Macrohairs.—None seen (Plate 52*f*).

Microstegium nudum (Trinius) A. Camus

Plates 53, 54

Abaxial

Stomata.—Common to abundant; low-dome, triangular or sometimes high-dome; 2-4 stomatal bands/intercostal zone, 1 row/band (Plate 53*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends straight to convex or slightly concave; outline of walls indeterminable because of collapsed cells. *Papillae:* 3 or more/cell, single row or sometimes irregular, globose, uniform (Plate 53*b–d*).

Long Cells.—Long, narrow, width uniform; outline of walls indeterminable because of collapsed cells. *Papillae:* 3 or more/cell, single row, globose, uniform (Plate 53*a,d*).

Prickles.—Infrequent; marginal prickles only.

Short Cells.—Costal >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen. Cork cells are often papillate (Plate 53*e*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 53*e*).

Microhairs.—Common to abundant; two-celled; basal and apical equal in length, medium or basal shorter, apical slightly longer; apex rounded (Plate 53*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Common; low-dome to high-dome; 2–4 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 54*a,b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends straight to convex or slightly concave; outline of walls indeterminable because of collapsed cells. *Papillae:* 3 or more/cell, single row, globose, uniform (Plate 54*a–c*).

Long Cells.—Long, narrow, width uniform; outline of walls indeterminable because of collapsed cells. *Papillae:* None seen or 3 or more/cell, single row, globose, uniform (Plate 54*a,d*).

Prickles.—Infrequent; marginal prickles only.

Short Cells.—Costal solitary, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 54*d,e*).

Silica Bodies.—Costal nodular, dumbbell, ends rounded or straight, middle wide, short; intercostal not seen (Plate 54*d,e*).

Microhairs.—Common; two-celled; basal longer, apical slightly shorter; apex rounded (Plate 54*f*).

Macrohairs.—None seen.

Miscanthus violaceus (K. Schumann) Pilger

Plates 55, 56

Abaxial

Stomata.—Abundant; low-dome to triangular or sometimes appearing parallel because of collapsed cells; 2 stomatal bands/intercostal zone, 1 row/band (Plate 55*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; nonsinuous (may be an artifact of collapsed cells). *Papillae:* None seen or 1/cell, globose, uniform or cell slightly raised (Plate 55*b,c*).

Long Cells.—Rectangular, long, narrow, width uniform; nonsinuous (may be an artifact of collapsed cells). *Papillae:* None seen (Plate 55*b,c*).

Prickles.—Infrequent; intercostal prickles (Plate 55*a*).

Short Cells.—Costal solitary, paired, >5/row; intercostal solitary, paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 55*c–e*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide or narrow, short; intercostal cross-shaped (Plate 55*d,e*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 55*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome to triangular or sometimes appearing parallel because of collapsed cells; 1 or 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 56*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or cell slightly raised (Plate 56*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 56*c,e*).

Prickles.—None seen.

Short Cells.—Costal solitary, >5/row; intercostal solitary. *Silica Cells:* Costal and intercostal infrequent. *Cork Cells:* Costal and intercostal infrequent (Plate 56*d,e*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide, short; intercostal cross-shaped, dumbbell, ends straight, middle wide, short (Plate 56*d,e*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium; apex rounded (Plate 56*f*).

Macrohairs.—None seen.

Monocymbium deightonii C.E. Hubbard

Plates 57, 58

Abaxial

Stomata.—Abundant; low-dome; 1 or 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 57*b*).

Interstomatal Cells.—Rectangular; ends slightly concave (?); markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. The whole cell appears raised and is often collapsed (Plate 57*b,c*).

Long Cells.—Long, narrow, width uniform and nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen, whole cell raised, or 1/cell, globose, uniform (Plate 57*a,c*).

Prickles.—Infrequent; marginal prickles.

Short Cells.—Costal >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common (Plate 57*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 57*d,e*).

Microhairs.—Common; two-celled; basal slightly longer, apical shorter or basal and apical equal in length, medium; apex rounded (Plate 57*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome; distribution indeterminable (Plate 58*b*).

Interstomatal Cells.—Shape indeterminable; ends slightly concave; slightly sinuous (?). *Papillae:* None seen (Plate 58*b*).

Long Cells.—Long, narrow, width uniform; slightly and markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 58*a,c*).

Prickles.—Infrequent; intercostal prickles (Plate 58*e*).

Short Cells.—Costal >5/row; intercostal paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 58*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical (Plate 58*c,d*).

Microhairs.—Infrequent; basal slightly longer, apical shorter or basal and apical equal in length, medium; apex rounded (Plate 58*f*).

Macrohairs.—None seen.

Oxyrhachis gracillima (Baker) C.E. Hubbard

Plates 59, 60

Abaxial

Stomata.—Common; high-dome; distribution is indeterminable because of overarching papillae (Plate 59*b,c*).

Interstomatal Cells.—Rectangular; ends straight; nonsinuous. *Papillae:* None seen or 1/cell, globose to elongate, uniform (Plate 59*b,c*).

Long Cells.—Shape and walls indeterminable because of large, densely distributed, papillae (Plate 59*a,b*).

Prickles.—Infrequent; intercostal prickles.

Short Cells.—None seen.

Silica Bodies.—None seen.

Microhairs.—Infrequent (possibly hidden by papillae); two-celled; basal shorter, apical longer; apex rounded (Plate 59*b*).

Macrohairs.—None seen.

Special Features.—This species has very narrow leaves that are tightly rolled.

Adaxial

Stomata.—None seen.

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 60*a,c*).

Prickles.—None seen.

Short Cells.—Costal and intercostal zones indistinguishable. Short cells paired or sometimes 3–5/row (Plate 60*b,c*).

Silica Bodies.—Crenate-vertical, cross-shaped, figure-eight, dumbbell, ends rounded, middle wide, short (Plate 60*b,c*).

Microhairs.—None seen.

Macrohairs.—None seen.

Special Features.—This species has very narrow leaves that are tightly rolled.

Phacelurus huillensis (Rendle) W.D. Clayton

Plates 61, 62

Abaxial

Stomata.—Abundant; low-dome, triangular; 8 or 9 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 61*b,c*).

Interstomatal Cells.—Rectangular; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are two interstomatals and a silica cell between stomata (Plate 61*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cells adjacent to stomata appear raised. See Prickles (Plate 61*a,c*).

Prickles.—Abundant; costal papillate-type prickles (Plate 61*d*).

Short Cells.—Costal solitary, paired; intercostal solitary (silica cells only), paired (sometimes two silica cells). *Silica Cells:* Costal infrequent; intercostal abundant. *Cork Cells:* Costal infrequent; intercostal abundant (Plate 61*d,e*).

Silica Bodies.—Costal and intercostal cross-shaped (Plate 61*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 61*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome; distribution indeterminable (Plate 62*b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cells adjacent to stomata appear raised. See Prickles (Plate 62*a,c*).

Prickles.—Common; costal papillate-type prickles (Plate 62*c*).

Short Cells.—Costal solitary, paired; intercostal solitary (silica cells only), paired (sometimes two silica cells). *Silica Cells:* Costal infrequent; intercostal abundant. *Cork Cells:* Costal infrequent; intercostal common (Plate 62*c,d*).

Silica Bodies.—Costal and intercostal cross-shaped (Plate 62*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 62*e*).

Macrohairs.—Infrequent; intercostal; basal cells slightly raised (Plate 62*f*).

Rhytachne latifolia W.D. Clayton

Plates 63, 64

Abaxial

Stomata.—Common; low-dome; 4 or sometimes 5 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 63*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 63*a*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 63*a,c*).

Prickles.—None seen.

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal infrequent (Plate 63*c–e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends concave, middle wide, short; intercostal cross-shaped (Plate 63*c–e*).

Microhairs.—Common to abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 63*c,f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Common; low-dome; 4–6 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 64*a–c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 64*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 64*a*).

Prickles.—None seen.

Short Cells.—Costal solitary (silica cells only), paired, 3–5/row, >5/row; intercostal paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 64*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends rounded to concave, middle wide, short; intercostal crenate-vertical, cross-shaped, figure-eight (Plate 64*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex tapered (Plate 64*f*).

Macrohairs.—None seen.

Rottboellia cochinchinensis (Loureiro) W.D. Clayton

Plates 65, 66

Abaxial

Stomata.—Common to abundant; low-dome or sometimes triangular; 1 stomatal band/intercostal zone, 1 or sometimes 2 rows/band (Plate 65*a,b*).

Interstomatal Cells.—Square to rectangular; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are two interstomatals and a silica cell between stomata (Plate 65*a,b*).

Long Cells.—Rectangular or long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 65*c*).

Prickles.—Infrequent to common; costal prickles (Plate 65*e*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 65*c–e*).

Silica Bodies.—Costal dumbbell, ends rounded, straight, middle wide, short; intercostal crenate-vertical (Plate 65*c–e*).

Microhairs.—Infrequent to common; two-celled; basal shorter, apical slightly longer; apex rounded (Plate 65*e,f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome or sometimes triangular; stomata too infrequent to determine distribution (Plate 66*b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 66*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 66*c,e*).

Prickles.—Infrequent to common; costal prickles; intercostal hooks (Plate 66*c,d*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal and intercostal common (Plate 66*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends rounded

to concave, middle wide, short; intercostal crenate-vertical (Plate 66*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 66*f*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 66*a*).

Saccharum spontaneum subsp. *aegyptiacum* (Willdenow) Hackel

Plates 67, 68

Abaxial

Stomata.—Common; low-dome, triangular; 1 stomatal band/intercostal zone, 2 rows/band. Stomata are often obscured in grooves (Plate 67*b*).

Interstomatal Cells.—Square, rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or cell slightly raised (Plate 67*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 3 or more/cell, single row, globose, variable (Plate 67*a,c*).

Prickles.—Abundant; costal and intercostal prickles (Plate 67*c*).

Short Cells.—Costal paired, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 67*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short, nodular, and sometimes cross-shaped; intercostal not seen (Plate 67*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical slightly longer; apex tapered (?). Microhairs are hidden in intercostal grooves (Plate 67*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Common; low-dome, triangular; 1 or 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 68*b*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 68*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 3 or more/cell, single row, globose, variable (Plate 68*a,c*).

Prickles.—Common; costal and intercostal prickles (Plate 68*c*).

Short Cells.—Costal solitary, paired, >5/row; intercostal paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 68*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 68*d,e*).

Microhairs.—Infrequent; two-celled; basal shorter, apical slightly longer; apex tapered (?) (Plate 68*f*).

Macrohairs.—None seen.

Schizachyrium rupestre (K. Schumann) Stapf

Plates 69, 70

Abaxial

Stomata.—Abundant; low-dome; 1 stomatal band/intercostal zone, 1 or sometimes 2 rows/band (Plate 69*b,c*).

Interstomatal Cells.—Square; ends slightly to markedly concave; nonsinuous (difficult to determine because walls are obscured by wax). Sometimes cells are very reduced, and stomata are almost touching. *Papillae:* None seen or sometimes cell raised (Plate 69*b,c*).

Long Cells.—Rectangular, long, narrow, width uniform; nonsinuous (difficult to determine because walls are obscured by wax). *Papillae:* None seen (Plate 69*a,c*).

Prickles.—Abundant; costal prickles; intercostal hooks (Plate 69*e*).

Short Cells.—Costal paired, 3–5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 69*d,e*).

Silica Bodies.—Costal dumbbell, ends straight (?), middle wide, short; intercostal not seen (Plate 69*d,e*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium or basal shorter, apical longer; apex rounded (Plate 69*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—None seen.

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 70*a,b*).

Prickles.—Common; costal prickles; intercostal hooks (Plate 70*c,e,f*).

Short Cells.—Costal paired, 3–5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 70*d,f*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal not seen (Plate 70*d,f*).

Microhairs.—None seen.

Macrohairs.—None seen.

Sehima nervosum (Rottler) Stapf

Plates 71, 72

Abaxial

Stomata.—Abundant; parallel to low-dome; 1 stomatal band/intercostal zone, 1 row/band (Plate 71*a,b*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None

seen (Plate 71*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 71*d,e*).

Prickles.—Abundant; costal prickles; intercostal hooks (Plate 71*a,f*).

Short Cells.—Costal solitary, paired, 3–5/row; intercostal solitary. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 71*d,f*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle short and narrow; intercostal not seen (Plate 71*d,f*).

Microhairs.—Abundant; two-celled; basal and apical equal in length, long; apex tapered (Plate 71*e*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; low-dome to triangular; 2 stomatal bands/intercostal zone, 1 row/band. Stomata occur only near margin (Plate 72*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 72*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 72*c,f*).

Prickles.—Abundant; costal prickles; intercostal prickles and hooks (Plate 72*f*).

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal common (Plate 72*c,d*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle narrow, long; intercostal cross-shaped (Plate 72*b,d*).

Microhairs.—Common; two-celled; basal and apical equal in length, long; apex tapered (Plate 72*e*).

Macrohairs.—None seen.

Sorghastrum bipennatum (Hackel) Pilger

Plates 73, 74

Abaxial

Stomata.—Abundant; low-dome to triangular; 1 or 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 73*a–c*).

Interstomatal Cells.—Square; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform (Plate 73*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 73*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal not seen. *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal not seen (Plate 73*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide or narrow, short; intercostal not seen (Plate 73*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical slightly longer; apex rounded (Plate 73*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent to common; triangular or sometimes low-dome; 1 or 2 stomatal bands/intercostal zone, 1 row/band (Plate 74*a,b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 74*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 74*a,c*).

Prickles.—Infrequent; marginal and intercostal prickles (Plate 74*a*).

Short Cells.—Costal paired, >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 74*d*).

Silica Bodies.—Costal dumbbell, ends straight to concave, middle wide, short; intercostal not seen (Plate 74*d*).

Microhairs.—Common; two-celled; basal and apical equal in length, medium or basal shorter, apical slightly longer; apex rounded (Plate 74*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 74*f*).

Sorghum arundinaceum (Desvaux) Stapf

Plates 75, 76

Abaxial

Stomata.—Abundant; low-dome; 3–5 stomatal band/intercostal zone, 1 or 2 rows/band (Plate 75*b,c*).

Interstomatal Cells.—Square to rectangular; ends straight; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised near one end of cell (Plate 75*b,c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised near one end of cell (Plate 75*a,c*).

Prickles.—Infrequent; marginal prickles.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common (Plate 75*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 75*c–e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 75*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome to triangular; 3–6 stomatal bands/intercostal zone, 1–3 rows/band (Plate 76*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 76*b,c*).

Long Cells.—Square, rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 76*a–c*).

Prickles.—Common; costal prickles and papillate-type prickles; intercostal papillate-type prickles (Plate 76*a,b*).

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 76*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal cross-shaped, crenate-vertical (Plate 76*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 76*f*).

Macrohairs.—None seen.

Thelepogon elegans Roemer & Schultz

Plates 77, 78

Abaxial

Stomata.—Common to abundant; low-dome to triangular; 12–17 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 77*b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 77*a*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 77*a*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal not seen (Plate 77*c,d*).

Silica Bodies.—Costal dumbbell, ends straight to convex, middle wide, short; intercostal cross-shaped (Plate 77*c,d*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 77*e*).

Macrohairs.—Infrequent; costal; basal cells markedly raised. Macrohairs are on midvein only (Plate 77*f*).

Adaxial

Stomata.—Common; low-dome to triangular; 8–12 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 78*a,b*).

Interstomatal Cells.—Long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 78*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 78*a,c*).

Prickles.—Infrequent; marginal prickles only.

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal not seen (Plate 78*d,e*).

Silica Bodies.—Costal dumbbell, ends concave to straight, middle wide, short; intercostal cross-shaped (Plate 78*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 78*f*).

Macrohairs.—None seen.

Themeda triandra Forsskål

Plates 79, 80

Abaxial

Stomata.—Abundant; low-dome to triangular; 1 stomatal band/intercostal zone, 1 or 2 rows/band. There is a pair of papillae on each subsidiary cell. The intercostal zone is very narrow (Plate 79*a,b*).

Interstomatal Cells.—Square, rectangular; ends straight to convex or slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, usually two pairs or sometimes irregular, globose, uniform (Plate 79*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, single row, globose, uniform (Plate 79*a,d*).

Prickles.—Common; costal prickles (Plate 79*a*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary (cork cells only). *Silica Cells:* Costal abundant; intercostal not seen. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 79*a,d*).

Silica Bodies.—Costal nodular, dumbbell, ends concave or straight, middle wide, short; intercostal not seen (Plate 79*d*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 79*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 79*f*).

Adaxial

Stomata.—None seen.

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, single row, globose, uniform (Plate 80*b,c*).

Prickles.—Common; costal and intercostal prickles (Plate 80*a,b*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal not seen. *Silica Cells:* Costal common to abundant; intercostal not seen. *Cork Cells:* Costal common to abundant; intercostal not seen (Plate 80*c–e*).

Silica Bodies.—Costal dumbbell, ends concave or straight, middle wide, short; intercostal not seen (Plate 80*c–e*).

Microhairs.—Common to abundant; two-celled; basal longer, apical shorter; apex tapered (?)(Plate 80*f*).

Macrohairs.—None seen.

Trachypogon spicatus (Linnaeus f.) Kuntze

Plates 81, 82

Abaxial

Stomata.—Abundant; low-dome, triangular; 1 stomatal band/intercostal zone, 1 row/band (Plate 81*b,c*).

Interstomatal Cells.—Square, rectangular; ends straight to convex or markedly concave; markedly sinuous, interlocking raised. *Papillae:* None seen or 1/cell, globose, uniform or sometimes cell raised. Papillae are sometimes located near one end of cell (Plate 81*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform. Papillae are on cells adjacent to stomata and opposite stomata and are sometimes located near one end of cell (Plate 81*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common (Plate 81*c,d*).

Silica Bodies.—Costal dumbbell, ends rounded or straight, middle narrow, short; intercostal cross-shaped, figure-eight, narrowly saddle-shaped (Plate 81*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex tapered (Plate 81*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 81*f*).

Adaxial

Stomata.—Abundant; low-dome, triangular; 1 stomatal band/intercostal zone, 1 or sometimes 2 rows/band (Plate 82*b,c*).

Interstomatal Cells.—Rectangular, square; ends straight to convex or slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or cell raised. Papillae are sometimes located near one end of cell (Plate 82*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform. Papillae are on cells adjacent to stomata and opposite stomata and are sometimes located near one end of cell (Plate 82*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (cork cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common (Plate 82*d,e*).

Silica Bodies.—Costal dumbbell, ends rounded or straight, middle narrow or wide, short; intercostal crenate-vertical (Plate 82*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 82*b*).

Macrohairs.—Infrequent; intercostal; basal cells slightly raised (Plate 82*f*).

Urelytrum digitatum K. Schumann

Plates 83, 84

Abaxial

Stomata.—Abundant; low-dome, triangular; 2 or 3 bands/intercostal zone, 1 or 2 rows/band (Plate 83*b*).

Interstomatal Cells.—Square, rectangular; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 83*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 83*a,c*).

Prickles.—Infrequent; intercostal hooks.

Short Cells.—Costal solitary (silica cells only), paired, >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal infrequent (Plate 83*b,d*).

Silica Bodies.—Costal cross-shaped, nodular, dumbbell, ends rounded, middle wide, short; intercostal narrowly saddle-shaped, cross-shaped, tall and narrow (Plate 83*b,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 83*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 83*f*).

Adaxial

Stomata.—Common; low-dome, triangular; 2 or 3 bands/intercostal zone, 1–3 rows/band (Plate 84*b*).

Interstomatal Cells.—Rectangular to long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 84*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 84*a,c*).

Prickles.—None seen.

Short Cells.—Costal solitary (silica cells only), paired, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal abundant; intercostal common (Plate 84*c,d*).

Silica Bodies.—Costal cross-shaped to square, dumbbell, ends rounded, middle wide, short; intercostal narrowly saddle-shaped, cross-shaped to square (Plate 84*c,d*).

Microhairs.—Infrequent; two-celled; basal shorter, apical longer; apex rounded (Plate 84*e*).

Macrohairs.—Common; intercostal; basal cells slightly raised (Plate 84*f*).

Vetiveria nigritana (Bentham) Stapf

PLATES 85, 86

ABAXIAL

STOMATA.—Common; low-dome; 10 to 12 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band (Plate 85*a,b*).

INTERSTOMATAL CELLS.—Long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 85*c*).

LONG CELLS.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 85*c*).

PRICKLES.—None seen.

SHORT CELLS.—Costal solitary, paired, 3–5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal infrequent (Plate 85*d,e*).

SILICA BODIES.—Costal cross-shaped or dumbbell, ends rounded or concave, middle wide, short; intercostal cross-shaped (Plate 85*d,e*).

MICROHAIRS.—Common to abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 85*f*).

MACROHAIRS.—None seen.

ADAXIAL

STOMATA.—Common; low-dome to triangular; 3 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 86*a,b*).

INTERSTOMATAL CELLS.—Rectangular to long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 86*c*).

LONG CELLS.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 86*a,d*).

PRICKLES.—Common to abundant; costal and intercostal prickles (Plate 86*a*).

SHORT CELLS.—Costal solitary (silica cells only), paired, 3–5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 86*a,d*).

SILICA BODIES.—Costal cross-shaped, dumbbell, ends rounded, concave, or straight, middle wide, short; intercostal cross-shaped (Plate 86*a,d*).

MICROHAIRS.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 86*e*).

MACROHAIRS.—Infrequent to common; intercostal; basal cells slightly raised. Macrohairs are arranged in rows of four along the leaf (Plate 86*f*).

Vossia cuspidata (Roxburgh) Griffith

PLATES 87, 88

ABAXIAL

STOMATA.—Abundant; parallel to low-dome; 2 or 3 stomatal bands/intercostal zone, 1 row/band (Plate 87*b,c*).

INTERSTOMATAL CELLS.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, uniform. Papillae are often near one end of cell (Plate 87*c*).

LONG CELLS.—Rectangular; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, uniform. Papillae are often near one end of cell (Plate 87*b,f*).

PRICKLES.—Abundant; costal prickles. Prickles are quite large and often appear deflated or with a depression on upper surface (Plate 87*a,f*).

SHORT CELLS.—Costal and intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal not seen (Plate 87*d,e*).

SILICA BODIES.—Costal and intercostal cross-shaped, crenate-vertical (Plate 87*d,e*).

MICROHAIRS.—Abundant; two-celled; basal and apical equal in length, long; apex rounded (Plate 87*e*).

MACROHAIRS.—None seen.

ADAXIAL

STOMATA.—Abundant; parallel to low-dome; 1 stomatal band/intercostal zone, 1 or 2 rows/band (Plate 88*a,b*).

INTERSTOMATAL CELLS.—Rectangular to long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, uniform. Papillae are often near one end of cell (Plate 88*b*).

LONG CELLS.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, variable. Papillae are often near one end of cell (Plate 88*a,d*).

PRICKLES.—Abundant; costal prickles and short macrohair-type prickles; intercostal short macrohair-type prickles (Plate 88*a,e*).

SHORT CELLS.—Costal and intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal not seen (Plate 88*b,d*).

SILICA BODIES.—Costal and intercostal cross-shaped, crenate-vertical (Plate 88*b,d*).

MICROHAIRS.—Common; two-celled; basal shorter, apical longer; apex tapered (Plate 88*e*).

MACROHAIRS.—Abundant; intercostal; basal cells markedly raised. See Prickles (Plate 88*a,f*).

Tribe MAYDEAE

Coix lacryma-jobi Linnaeus

PLATES 89, 90

ABAXIAL

STOMATA.—Common; triangular; 2 or 3 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 89*b,c*).

INTERSTOMATAL CELLS.—Square, rectangular; ends slightly

concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are >1 interstomatal cell(s) and short cell(s) between stomata (Plate 89*b,c*).

Long Cells.—Square, rectangular, pentagonal, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen. Some areas in the intercostal zones consist of raised and sometimes undefined cells (Plate 89*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 89*b,d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 89*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 89*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; triangular; 3 or 4 stomatal bands/intercostal zone; 1 or 2 rows/band (Plate 90*b,c*).

Interstomatal Cells.—Square, rectangular; ends straight to slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. There are often >1 interstomatal cell(s) and short cell(s) between stomata (Plate 90*b,c*).

Long Cells.—Square, rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 90*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal abundant (Plate 90*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 90*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 90*f*).

Macrohairs.—None seen.

Tripsacum andersonii Gray

Plates 91, 92

Abaxial

Stomata.—Abundant; low-dome, triangular; 2 or 3 stomatal bands/intercostal zone, 1 row/band (Plate 91*b*).

Interstomatal Cells.—Square, rectangular, long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. There are sometimes two interstomatals separated by a silica body between stomata (Plate 91*a,b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1 or 2/cell (part of cell adjacent to stomata is slightly raised) (Plate 91*a,c*).

Prickles.—None seen.

Short Cells.—Costal paired, 3–5/row; intercostal solitary (silica only), paired. *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal abundant. Costal zones are not well defined (Plate 91*d,e*).

Silica Bodies.—Costal cross-shaped or sometimes dumbbell, ends concave, middle wide, short; intercostal crenate-vertical, cross-shaped, nodular, dumbbell, ends concave, middle wide, short (Plate 91*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 91*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome; 2–4 stomatal bands/intercostal zone, 1 row/band (Plate 92*b,c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly or markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are several interstomatals and silica bodies between stomata (Plate 92*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell adjacent to stomata slightly raised (Plate 92*a,c*).

Prickles.—Common; intercostal prickles (Plate 92*e*).

Short Cells.—Costal 3–5/row; >5/row. *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal and intercostal common (Plate 92*b–d*).

Silica Bodies.—Costal cross-shaped, nodular, dumbbell, ends rounded or concave, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 92*b–d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 92*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 92*f*).

Zea mays Linnaeus

Plates 93, 94

Abaxial

Stomata.—Abundant; low-dome, triangular; 16–18 stomatal bands/intercostal zone, 1 row/band (Plate 93*b,c*).

Interstomatal Cells.—Square, rectangular, long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 93*b,c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 93*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal infrequent; intercostal abundant. *Cork*

Cells: Costal infrequent; intercostal abundant (Plate 93*d,e*).

Silica Bodies.—Costal nodular, dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical, cross-shaped, figure-eight (Plate 93*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 93*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome, triangular; 26 stomatal bands/intercostal zone, 1 row/band (Plate 94*b,d*).

Interstomatal Cells.—Square, rectangular, long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 94*b,d*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or cell raised (Plate 94*b,c*).

Prickles.—Common; costal and intercostal prickles (often with deflated bases), costal short macrohair-type prickles (Plate 94*a*).

Short Cells.—Costal paired, 3–5/row, >5/row; intercostal solitary, paired. *Silica Cells:* Costal infrequent; intercostal abundant. *Cork Cells:* Costal infrequent; intercostal abundant (Plate 94*c,d*).

Silica Bodies.—Costal nodular, dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical, cross-shaped, figure-eight (Plate 94*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 94*e*).

Macrohairs.—Common; intercostal; basal cells slightly raised. See Prickles (Plate 94*f*).

West African Supplement

Tribe Bambuseae

Bambusa vulgaris Schrader ex Wendelberger

Plates 95, 96

Abaxial

Stomata.—Common; subsidiary cell shape indeterminable; 2 stomatal bands/intercostal zone, 1 or sometimes 2 rows/band. Stomata are obscured by overarching papillae (Plate 95*b*).

Interstomatal Cells.—Long, narrow, width uniform; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 95*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 95*a*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 95*e*).

Short Cells.—Costal solitary (silica cells only), 3–5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal infrequent; intercostal not seen (Plate 95 *a,c,d*).

Silica Bodies.—Costal narrowly saddle-shaped; intercostal figure-eight and sometimes crenate-vertical (Plate 95*a,c,d*).

Microhairs.—Common; two-celled; basal and apical equal in length, long; apex rounded (Plate 95*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Common; subsidiary cell shape indeterminable; 2 stomatal bands/intercostal zone, 1 or sometimes 2 or 3 rows/band. Stomata are obscured by overarching papillae (Plate 96*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 3 or more/cell, irregular, globose, uniform (Plate 96*b*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 96*a*).

Prickles.—Common; costal and intercostal prickles (Plate 96*e*).

Short Cells.—Costal paired, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 96*c,d*).

Silica Bodies.—Costal narrowly saddle-shaped; intercostal figure-eight, and sometimes crenate-vertical or narrowly saddle-shaped (Plate 96*c,d*).

Microhairs.—Common; two-celled; basal and apical equal in length, long, or basal slightly longer, apical shorter; apex rounded (Plate 96*f*).

Macrohairs.—None seen.

Guaduella oblonga Hutchinson ex W.D. Clayton

Plates 97, 98

Abaxial

Stomata.—Abundant; low-dome, triangular; 4 stomatal bands/intercostal zone, 1 or 2 rows/band. Stomata are sometimes obscured by overarching papillae. Stomatal bands are located adjacent to veins and separated by a wide area of long cells (Plate 97*b,c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly concave or sometimes obscured by

papillae; markedly sinuous, interlocking, raised. *Papillae:* None seen or 3 or more/cell, irregular, globose, uniform. Sometimes there is more than one interstomatal cell between stomata (Plate 97*b,c*).

Long Cells.—Rectangular to long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or sometimes 3 or more/cell, irregular, globose, uniform (Plate 97*a,f*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 97*e*).

Short Cells.—Costal >5/row; intercostal paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal abundant. Cork cells are sometimes papillate (Plate 97*b,d*).

Silica Bodies.—Costal widely saddle-shaped; intercostal narrowly saddle-shaped, figure-eight (Plate 97*b–d*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 97*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent; triangular, high-dome; distribution indeterminable (Plate 98*b*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen. There are large, square, silicified (?) structures irregularly occurring on costal (?) areas (Plate 98*a,c*).

Prickles.—Infrequent; prickles and short macrohair-type prickles on midvein only (Plate 98*f*).

Short Cells.—Costal >5/row (?); intercostal solitary (silica cells only), paired. *Silica Cells:* Costal infrequent; intercostal abundant. *Cork Cells:* Costal infrequent; intercostal common (Plate 98*b,d*).

Silica Bodies.—Costal narrowly saddle-shaped; intercostal narrowly saddle-shaped to figure-eight (Plate 98*b,d*).

Microhairs.—Infrequent; two-celled; basal longer, apical shorter; apex rounded (Plate 98*e*).

Macrohairs.—See Prickles.

Tribe Agrostideae

Hypseochloa cameroonensis C.E. Hubbard

Plates 99, 100

Abaxial

Stomata.—Common; low-dome (?); 2 stomatal bands/intercostal zone, 1 row/band. Subsidiary cell shape is difficult to determine because cells are collapsed (Plate 99*a,b*).

Interstomatal Cells.—Rectangular, hexagonal; ends straight to convex; nonsinuous (?) (Cells are collapsed.). *Papillae:* None seen or 1/cell, globose, uniform. It appears that each cell has a large thin-walled papilla that has collapsed (Plate 99*b,c*).

Long Cells.—Hexagonal, long, narrow, width uniform; nonsinuous (?). Outline of cell is difficult to determine because of collapsed cells. *Papillae:* None seen or 1/cell, globose, uniform. It appears that each cell has a large thin-walled papilla that has collapsed (Plate 99*a,c*).

Prickles.—Infrequent; intercostal prickles (Plate 99*c*).

Short Cells.—Costal >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 99*d,e*).

Silica Bodies.—Costal dumbbell, ends concave, middle wide, short; intercostal not seen (Plate 99*d,e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 99*e*).

Macrohairs.—Common; intercostal; basal cells slightly to markedly raised (Plate 99*f*).

Adaxial

Stomata.—None seen.

Long Cells.—Long, narrow, width uniform; nonsinuous. *Papillae:* None seen (Plate 100*a,b*).

Prickles.—Infrequent; intercostal and marginal prickles (Plate 100*b*).

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen (Plate 100*c,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends rounded, middle narrow or sometimes wide, short; intercostal crenate-vertical, figure-eight (Plate 100*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex tapered (Plate 100*e*).

Macrohairs.—Common; intercostal; basal cells markedly raised (Plate 100*f*).

Special Features.—Irregular horizontal striations are found on long cells.

Tribe Aeluropodeae

Aeluropus lagopoides (Linnaeus) Trinius ex Thwaites

Plates 101, 102

Abaxial

Stomata.—Abundant; low-dome, triangular; 2 stomatal bands/intercostal zone, 2 or sometimes 1 row/band. Stomata obscured by overarching papillae (Plate 101*b*).

Interstomatal Cells.—Rectangular, sometimes square or long, narrow, width uniform; ends indeterminable because of overarching papillae; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, variable. Papillae are located near one end of cell (Plate 101*c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, variable. Papillae are located near one end of cell or sometimes in the center of the cell (Plate 101*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common. Cork cells are papillate (Plate 101*d–f*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal tall and narrow, crenate-vertical, narrowly saddle-shaped (Plate 101*d–f*).

Microhairs.—None seen. Microhairs may be indistinguishable from papillae.

Macrohairs.—None seen.

Adaxial

Stomata.—Infrequent to common; low-dome, triangular; 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 102*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, elongate, variable. Papillae are often located near one end of cell or sometimes in center. There are sometimes two interstomatal cells between stomata (Plate 102*c*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, elongate, variable. Papillae are often located near one end of cell or sometimes in center (Plate 102*a,c*).

Prickles.—Infrequent to common; costal prickles (Plate 102*a*).

Short Cells.—Costal >5/row; intercostal solitary. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common. Cork cells are papillate (Plate 102*b,d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal tall and narrow, square (Plate 102*b,d,e*).

Microhairs.—Infrequent to common; two-celled; basal longer, apical shorter (?). Apical cell is collapsed, therefore the ratio of the basal cell to the apical cell and shape of apex is indeterminable (Plate 102*f*).

Macrohairs.—None seen.

Tribe Arundinelleae

Danthoniopsis chevalieri A. Camus & C.E. Hubbard

Plates 103, 104

Abaxial

Stomata.—Abundant; low-dome or sometimes triangular; 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 103*b*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 103*a,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 103*b,c*).

Prickles.—Infrequent; margins only (Plate 103*e*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal common; intercostal infrequent (Plate 103*b,d*).

Silica Bodies.—Costal narrowly saddle-shaped (sometimes lobed), crescent-shaped, dumbbell, ends straight, middle wide, short; intercostal narrowly saddle-shaped (Plate 103*b,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex tapered (Plate 103*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome or sometimes triangular; 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 104*b*).

Interstomatal Cells.—Rectangular or sometimes square, long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 104*c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen. Intercostal zones have midridge with indistinct cells (Plate 104*c*).

Prickles.—Abundant; costal and intercostal prickles (Plate 104*a*).

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal not seen (Plate 104*b,d*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short or sometimes cross-shaped or square; intercostal narrowly saddle-shaped, cross-shaped, crescent-shaped (Plate 104*b,d*).

Microhairs.—Common; two-celled; basal and apical equal in length, long; apex tapered (Plate 104*e*).

Macrohairs.—Infrequent; intercostal; located in raised midridge; basal cells markedly raised (Plate 104*f*).

Loudetiopsis thoroldii (C.E. Hubbard) Phipps

Plates 105, 106

Abaxial

Stomata.—Low-dome. Stomata frequency and distribution is indeterminable because stomata are sunken in intercostal grooves (Plate 105*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; walls indeterminable. *Papillae:* None seen (Plate 105*b,c*).

Long Cells.—Long, narrow, width uniform; walls markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 105*a,c*).

Prickles.—Abundant; costal and intercostal (?) prickles, short macrohair-type prickles (Plate 105*e*).

Short Cells.—Costal solitary, paired, 3–5/row, >5/row;

intercostal not seen (possibly hidden in intercostal grooves). *Silica Cells:* Costal abundant; intercostal not seen (?). *Cork Cells:* Costal abundant; intercostal not seen (?) (Plate 105*c–e*).

Silica Bodies.—Costal dumbbell, ends straight, middle narrow, long; intercostal not seen (Plate 105*c–e*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 105*f*).

Macrohairs.—See Prickles.

Adaxial

Stomata.—Common; low-dome; 1 stomatal band/intercostal zone, 1 row/band (Plate 106*b,c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 106*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 106*a,c*).

Prickles.—Common to abundant; costal and intercostal prickles; intercostal hooks (Plate 106*a,d,e*).

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal not seen (Plate 106*d,e*).

Silica Bodies.—Costal dumbbell, ends concave, middle narrow, long or short; intercostal cross-shaped (often deformed with one arm missing) (Plate 106*d,e*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 106*f*).

Macrohairs.—None seen.

Tribe Paniceae

Ichnanthus vicinus (Bailey) Merrill

Plates 107, 108

Abaxial

Stomata.—Infrequent; low-dome, triangular; distribution indeterminable because so few stomata (Plate 107*b*).

Interstomatal Cells.—Shape indeterminable; ends slightly to markedly concave; slightly sinuous. *Papillae:* None seen (Plate 107*b,c*).

Long Cells.—Rectangular, pentagonal, long, narrow, width uniform; slightly to markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 107*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal common; intercostal not seen. Sometimes there are adjacent costal silica bodies (Plate 107*d,e*).

Silica Bodies.—Costal nodular, dumbbell, ends straight or sometimes lobed, middle narrow, short; intercostal cross-shaped (Plate 107*d,e*).

Microhairs.—Abundant; two-celled; basal and apical equal in length, medium to basal shorter, apical longer; apex rounded (Plate 107*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome; 2 stomatal bands/intercostal zone, 1 row/band (Plate 108*a,b*).

Interstomatal Cells.—Rectangular; ends slightly concave; slightly sinuous. *Papillae:* None seen (Plate 108*a,b*).

Long Cells.—Rectangular, long, narrow, width uniform and nonuniform; slightly sinuous. *Papillae:* None seen (Plate 108*a*).

Prickles.—None seen.

Short Cells.—Costal 3–5/row, >5/row; intercostal solitary (silica cells only). *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal not seen. Sometimes there are adjacent costal silica bodies (Plate 108*c,d*).

Silica Bodies.—Costal nodular, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped (Plate 108*c,d*).

Microhairs.—Abundant; two-celled; basal longer, apical shorter; apex rounded (Plate 108*e*).

Macrohairs.—Abundant; intercostal; basal cells markedly raised (Plate 108*f*).

Microcalamus barbinodis Franchet

Plates 109, 110

Abaxial

Stomata.—Common; low-dome, triangular; 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 109*b*).

Interstomatal Cells.—Square; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 109*b*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 109*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 109*c,d*).

Silica Bodies.—Costal dumbbell, ends rounded, concave, straight, middle narrow, short; intercostal crenate-vertical, cross-shaped (Plate 109*c,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 109*e*).

Macrohairs.—Infrequent; intercostal; basal cells slightly raised (Plate 109*f*).

Adaxial

Stomata.—Common; triangular; 2 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 110*b,c*).

Interstomatal Cells.—Square, long, narrow, width uniform; ends markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 110*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 110*a,d*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 110*d–f*).

Silica Bodies.—Costal widely saddle-shaped, cross-shaped, dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 110*d–f*).

Microhairs.—None seen.

Macrohairs.—None seen.

Special Features.—Intercostal, raised, silicified (?) rectangular structures present (Plate 110*a*).

Paratheria prostrata Grisebach

Plates 111, 112

Abaxial

Stomata.—Abundant; low-dome; 1 or 2 stomatal bands/intercostal zone, 1 row/band (Plate 111*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 111*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 111*a,b*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal abundant (Plate 111*c–e*).

Silica Bodies.—Costal dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical, cross-shaped. Sometimes there are two adjacent silica bodies (Plate 111*c–e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex tapered (Plate 111*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; high-dome; 2 stomatal bands/intercostal zone, 1 row/band (Plate 112*b,c*).

Interstomatal Cells.—Square, rectangular; ends straight to convex; nonsinuous. *Papillae:* None seen or 1/cell, globose, uniform or cell raised. There are sometimes two interstomatals between stomata (Plate 112*b,c*).

Long Cells.—Pentagonal, long, narrow, width uniform; nonsinuous. *Papillae:* None seen or 1/cell, globose, uniform or cell raised (Plate 112*a,c*).

Prickles.—Common; costal and intercostal prickles (Plate 112*d*).

Short Cells.—Costal 3–5/row, >5/row; intercostal paired. *Silica Cells:* Costal common; intercostal infrequent. *Cork Cells:* Costal common; intercostal infrequent (Plate 112*d,e*).

Silica Bodies.—Costal dumbbell, ends straight, middle wide, short; intercostal cross-shaped (Plate 112*d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex tapered (Plate 112*f*).

Macrohairs.—None seen.

Tribe Andropogoneae

Anadelphia trispiculata Stapf

Plates 113, 114

Abaxial

Stomata.—Common; low-dome to triangular; 2 or sometimes 1 band/intercostal zone, 1 or 2 rows/band (Plate 113*b,c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform, sometimes square; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or cell raised (Plate 113*c,d*).

Long Cells.—Rectangular, long, narrow, width uniform and nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen or 1/cell, globose, uniform or cell raised (Plate 113*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal not seen. *Silica Cells:* Costal common; intercostal not seen. *Cork Cells:* Costal common; intercostal not seen (Plate 113*e*).

Silica Bodies.—Costal dumbbell, ends rounded, middle narrow, long, sometimes nodular; intercostal not seen (Plate 113*e*).

Microhairs.—Common to abundant; two-celled; basal longer, apical slightly shorter; apex rounded (Plate 113*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—None seen.

Long Cells.—Long, narrow, width uniform and nonuniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 114*a,c*).

Prickles.—None seen.

Short Cells.—Costal paired (on midvein only), >5/row; intercostal paired. *Silica Cells:* Costal abundant; intercostal infrequent. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 114*b,d,e*).

Silica Bodies.—Costal narrowly saddle-shaped and crescent-shaped (on midvein only), dumbbell, ends rounded, middle narrow, long or short, wide; intercostal narrowly saddle-shaped, cross-shaped (Plate 114*b,d,e*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 114*f*).

Macrohairs.—None seen.

Lasiurus hirsutus (Forsskål) Boissier

Plates 115, 116

Abaxial

Stomata.—Abundant; low-dome to triangular; 1 (?) stomatal band/intercostal zone, 1 or 2 rows/band. Intercostal zones are difficult to determine (Plate 115*b,c*).

Interstomatal Cells.—Rectangular; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen. Sometimes there are two interstomatal cells or two interstomatals and a silica cell between stomata (Plate 115*a–c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 115*a,b*).

Prickles.—Common; costal (?) and intercostal prickles; intercostal short macrohair-type prickles (Plate 115*d*).

Short Cells.—Costal solitary (silica cells only), paired, 3–5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 115*c–e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends rounded, middle wide, short; intercostal crenate-vertical (Plate 115*c–e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 115*f*).

Macrohairs.—Abundant; intercostal; raised basal cells absent. See Prickles (Plate 115*a,d*).

Adaxial

Stomata.—Common; low-dome to triangular; 2 stomatal bands/intercostal zone, 1 row/band (Plate 116*b,c*).

Interstomatal Cells.—Square, rectangular; ends slightly to markedly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 116*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen. There are raised bands of indistinguishable long cells between the rows of stomata (Plate 116*a,c*).

Prickles.—Common; costal and intercostal prickles; intercostal short macrohair-type prickles (Plate 116*c,d*).

Short Cells.—Costal solitary, paired, 3–5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal and intercostal common. *Cork Cells:* Costal and intercostal common (Plate 110*b,d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends concave, middle wide, short; intercostal crenate-vertical (Plate 116*b,d*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 116*e*).

Macrohairs.—Abundant; intercostal and costal (?); raised basal cells absent. See Prickles (Plate 116*a,f*).

Parahyparrhenia annua (Hackel) W.D. Clayton

Plates 117, 118

Abaxial

Stomata.—Abundant; low-dome (?); 1 stomatal band/intercostal zone, 1 row/band. Subsidiary cell shape is difficult to determine because of collapsed cells (Plate 117*b,c*).

Interstomatal Cells.—Square, rectangular; ends straight to convex; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform (Plate 117*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 117*a,c*).

Prickles.—Infrequent; costal and intercostal prickles (Plate 117*c*).

Short Cells.—Costal >5/row; intercostal solitary (silica cells only), paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal infrequent (Plate 117*d*).

Silica Bodies.—Costal dumbbell, ends straight, middle short, wide or long, narrow, sometimes nodular; intercostal crenate-vertical, cross-shaped, dumbbell, ends straight, middle wide, short (Plate 117*d*).

Microhairs.—Common; two-celled; basal longer, apical shorter; apex rounded (Plate 117*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised (Plate 117*f*).

Adaxial

Stomata.—Common; low-dome; 2 stomatal bands/intercostal zone, 1 row/band (Plate 118*a,b*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* 1/cell, globose, uniform. Papillae are sometimes located near one end of cell. There are often two interstomatal cells between stomata (Plate 118*a,b*).

Long Cells.—Rectangular, long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 118*c*).

Prickles.—Common; costal and intercostal prickles; sometimes costal short macrohair-type prickles (Plate 118*a,c*).

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal abundant; intercostal common. *Cork Cells:* Costal abundant; intercostal common. There are sometimes two adjacent silica bodies (Plate 118*d*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight or sometimes rounded, middle narrow, long or sometimes short; intercostal crenate-vertical, cross-shaped (Plate 118*d*).

Microhairs.—Infrequent; two-celled; basal shorter, apical longer; apex rounded (Plate 118*e*).

Macrohairs.—Infrequent; intercostal; basal cells markedly raised. See Prickles (Plate 118*f*).

Robynsiochloa purpurascens (Robyns) Jacques-Félix

Plates 119, 120

Abaxial

Stomata.—Abundant; triangular, low-dome, high-dome; 1–4 stomatal bands/intercostal zone, 1 or 2 rows/band (Plate 119*b,c*).

Interstomatal Cells.—Square, rectangular, long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking raised. *Papillae:* None seen (Plate 119*b,c*).

Long Cells.—Long, narrow, width uniform; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 119*a,c*).

Prickles.—None seen.

Short Cells.—Costal >5/row; intercostal solitary, paired. *Silica Cells:* Costal and intercostal abundant. *Cork Cells:* Costal and intercostal abundant (Plate 119*d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped, figure-eight (Plate 119*d,e*).

Microhairs.—Abundant; two-celled; basal shorter, apical longer; apex rounded (Plate 119*f*).

Macrohairs.—None seen.

Adaxial

Stomata.—Abundant; low-dome, triangular, high-dome; 1–4 stomatal bands/intercostal zone, 1–3 rows/band (Plate 120*b,c*).

Interstomatal Cells.—Rectangular, long, narrow, width uniform; ends slightly concave; markedly sinuous, interlocking, raised. *Papillae:* None seen (Plate 120*b,c*).

Long Cells.—Long, narrow, width uniform; markedly siunous, interlocking, raised. *Papillae:* None seen (Plate 120*a,c*).

Prickles.—None seen.

Short Cells.—Costal paired, >5/row; intercostal solitary, paired. *Silica Cells:* Costal common; intercostal abundant. *Cork Cells:* Costal common; intercostal abundant (Plate 120*b,d,e*).

Silica Bodies.—Costal cross-shaped, dumbbell, ends straight, middle wide, short; intercostal crenate-vertical, cross-shaped, figure-eight (Plate 120*b,d,e*).

Microhairs.—Common; two-celled; basal shorter, apical longer; apex rounded (Plate 120*f*).

Macrohairs.—None seen.

Appendix A

East African Material Studied

Species	*Collection*	*Origin*	*Herbarium*
Andropogon abyssinicus	Pedersen 1102	Tanzania	K
	Webster K55	Kenya	K
Andropterum stolzii	Wiehe N/293	Malawi	K
Arthraxon lancifolius	Milne-Redhead & Taylor 10110	Tanzania	US
Capillipedium parviflorum	Greenway 7783	Tanzania	K
Chrysopogon plumulosus	Ament & Magogo 324	Kenya	K
Cleistachne sorghoides	Bogdan AB2563	Kenya	K
Coelorhachis afraurita	Eggeling 1843	Uganda	K
Coix lacryma-jobi	Harris & Mwasumbi 955	Tanzania	MO
Cymbopogon nardus	Shantz 119	Kenya	US
Dichanthium annulatum	Renvoize & Abdallah 1802	Tanzania	K
Diheteropogon amplectens var. *catangensis*	Schlieben 3967	Tanzania	MO
Elionurus tripsacoides	Mitchell 13/01	N. Rhodesia	MO
Elymandra grallata	Salubeni 443	Malawi	US
Eriochrysis pallida	Lewalle 3938	Burundi	MO
Euclasta condylotricha	Kahurananga 2663	Tanzania	K
Eulalia villosa	Davidse 6852	S. Africa	MO
Exotheca abyssinica	Brass 17344	Malawi	US
Hackelochloa granularis	Wood 245	Uganda	K
Hemarthria natans	Archer 716	Kenya	K
Heteropholis sulcata	Milne-Redhead & Taylor 9058	Tanzania	K
Heteropogon melanocarpus	Mbano & Ndolanga 104	Tanzania	MO
Homozeugos eylesii	Webster T237	Tanzania	K
Hyparrhenia bracteata	Webster A247	N. Rhodesia	US
Hyperthelia dissoluta	Davidse 9212	Kenya	MO
Imperata cylindrica	Richards 26175	Tanzania	K
Ischaemum afrum	Faden 74/746	Kenya	K
Loxodera caespitosa	Webster A169	Zambia	MO
Microstegium nudum	Thomas 2263	Uganda	K
Miscanthus violaceus	Vesey-Fitzgerald 195	Kenya	K
*Monocymbium deightonii**	Adam 6837-7	French Guinea	MO
Oxyrhachis gracillima	Wingfield 587	Tanzania	K
	Robinson 3919	N. Rhodesia	MO
Phacelurus huillensis	Phipps & Vesey-Fitzgerald 3055	N. Rhodesia	MO
Rhytachne latifolia	Volleson MRC 2390	Tanzania	K
Rottboellia cochinchinensis	Bjornstad 228	Kenya	K

*This West African species has been substituted for the East African *M. ceressiforme* (Nees) Stapf, for which we were unable to get suitable material for study.

East African Material Studied—*Continued.*

Species	*Collection*	*Origin*	*Herbarium*
Saccharum spontaneum subsp. *aegyptiacum*	Thomas 3368	Uganda	K
Schizachyrium rupestre	Adam 24260	Liberia	MO
Sehima nervosum	Hudson 271	Uganda	US
Sorghastrum bipennatum	Greenway & Kanuri 15,464	Tanzania	MO
Sorghum arundinaceum	Myre 26	Mozambique	US
Thelepogon elegans	Richard 19,914	Tanzania	K
Themeda triandra	Shantz 255	Malawi	US
Trachypogon spicatus	Bouxin et Radoux 1150	Rwanda	MO
Tripsacum andersonii	Calderon 1332	El Salvador	MO
Urelytrum digitatum	Thomas 1293	Uganda	US
Vetiveria nigritana	Nicholson 35	Tanzania	K
Vossia cuspidata	Harris 1825	Tanzania	K
Zea mays	Asima 421	Ghana	US

Appendix B

West African Material Studied

Species	*Collection*	*Origin*	*Herbarium*
Aeluropus lagopoides	Arvidsson 61	Mauretania	K
Anadelphia trispiculata	Thorold 300	Ghana	US
Bambusa vulgaris	Palmer 895	Ghana	DU
Danthoniopsis chevalieri	Glanville 313	Sierre Leone	K
Guaduella oblonga	Baldwin 6704	Liberia	US
Hypseochloa cameroonensis	Maitland 874	Cameroun	K
Ichnanthus vicinus	Adams 807	Liberia	K
Lasiurus hirsutus	Rosetti 194	Mali	K
Loudetiopsis thoroldii	Ankah s.n. 30/IX/57	Ghana	K
Microcalamus barbinodis	Brenan 9442	Cameroun	K
Parahyparrhenia annua	Behrhaut 3199	Senegal	K
Paratheria prostrata	Jordan 282	Sierre Leone	K
Robynsiochloa purpurascens	Fay 6154	Cen. Afr. Rep.	MO

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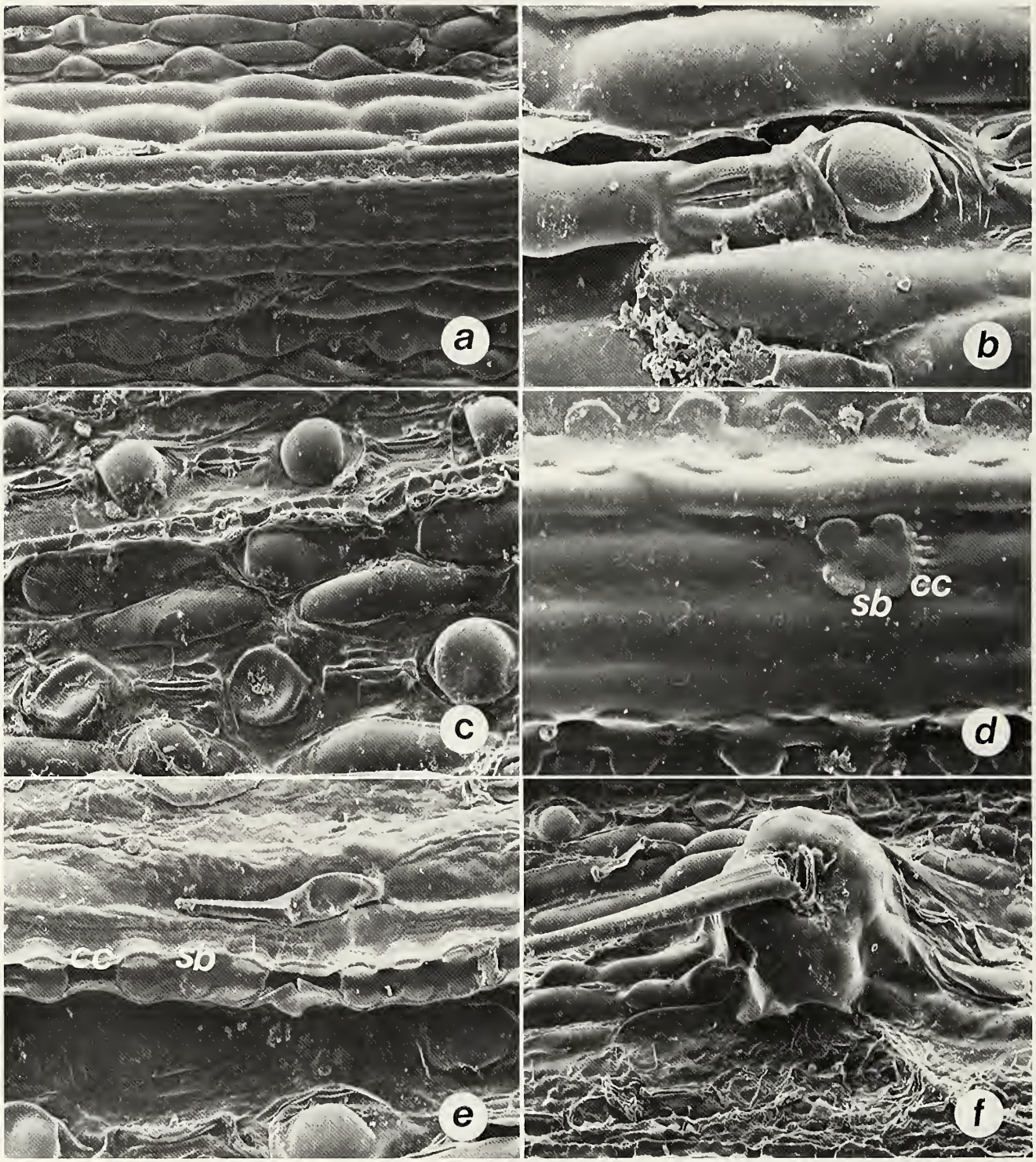

PLATE 1.—Abaxial epidermis *Andropogon abyssinicus*, Pedersen 1102: *a*, overview, long cells, ×240; *b*, stoma, interstomatal cell, ×640; *c*, interstomatal cells, long cells, ×480; *d*, intercostal silica bodies (sb), cork cells (cc), ×960; *e*, microhair, costal silica bodies (sb), cork cells (cc), ×640; *f*, base of macrohair, ×320.

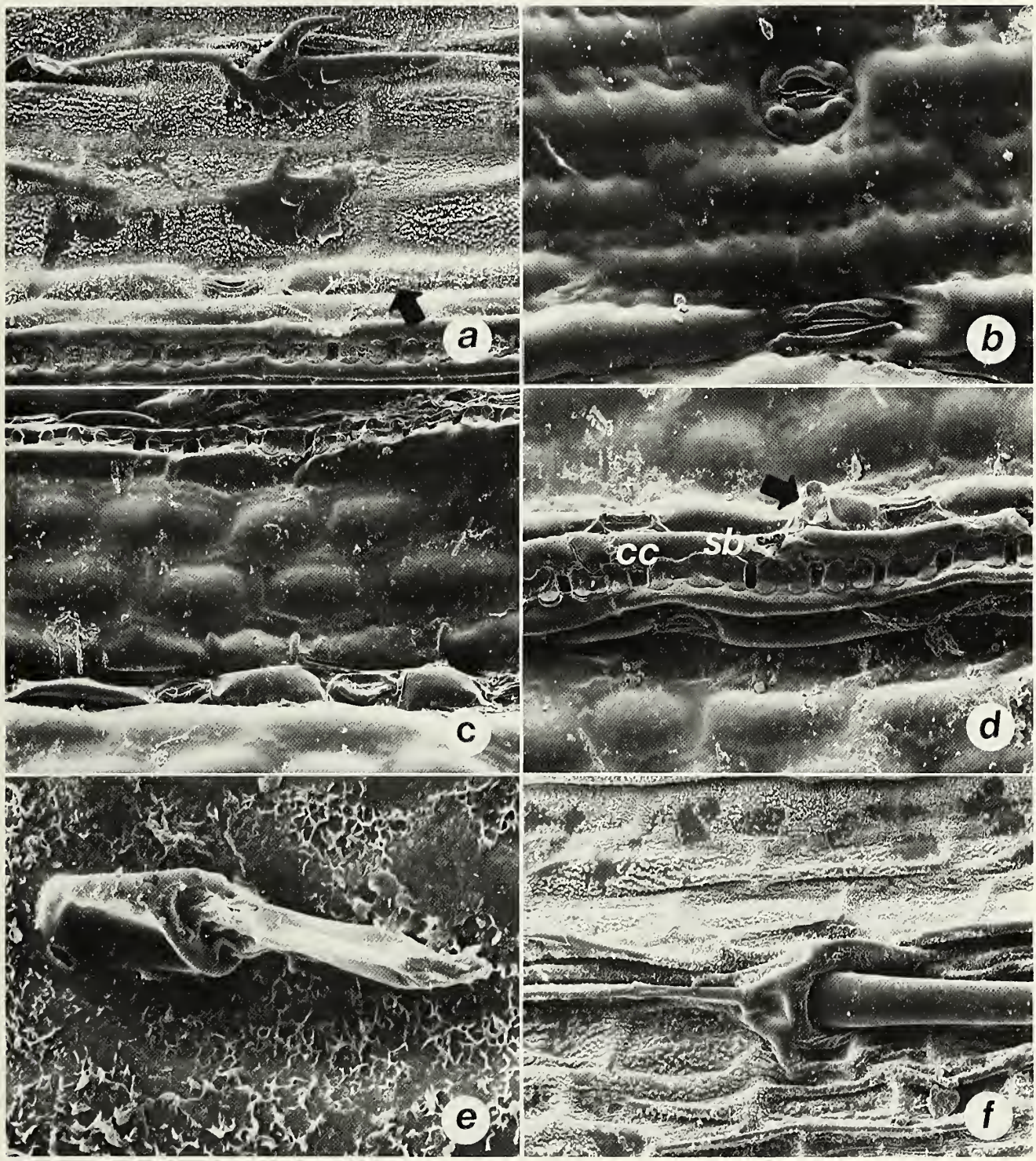

PLATE 2.—Adaxial epidermis *Andropogon abyssinicus*, Pedersen 1102 (*b–d*), Webster K55 (*a,e,f*): *a*, overview, interstomatal cell (arrow), short macrohair-type prickles, ×320; *b*, stomata, ×640; *c*, interstomatal cells, long cells, ×240; *d*, costal silica bodies (sb), cork cells (cc), intercostal silica body (arrow), ×320; *e*, microhair, ×1875; *f*, base of macrohair, ×320.

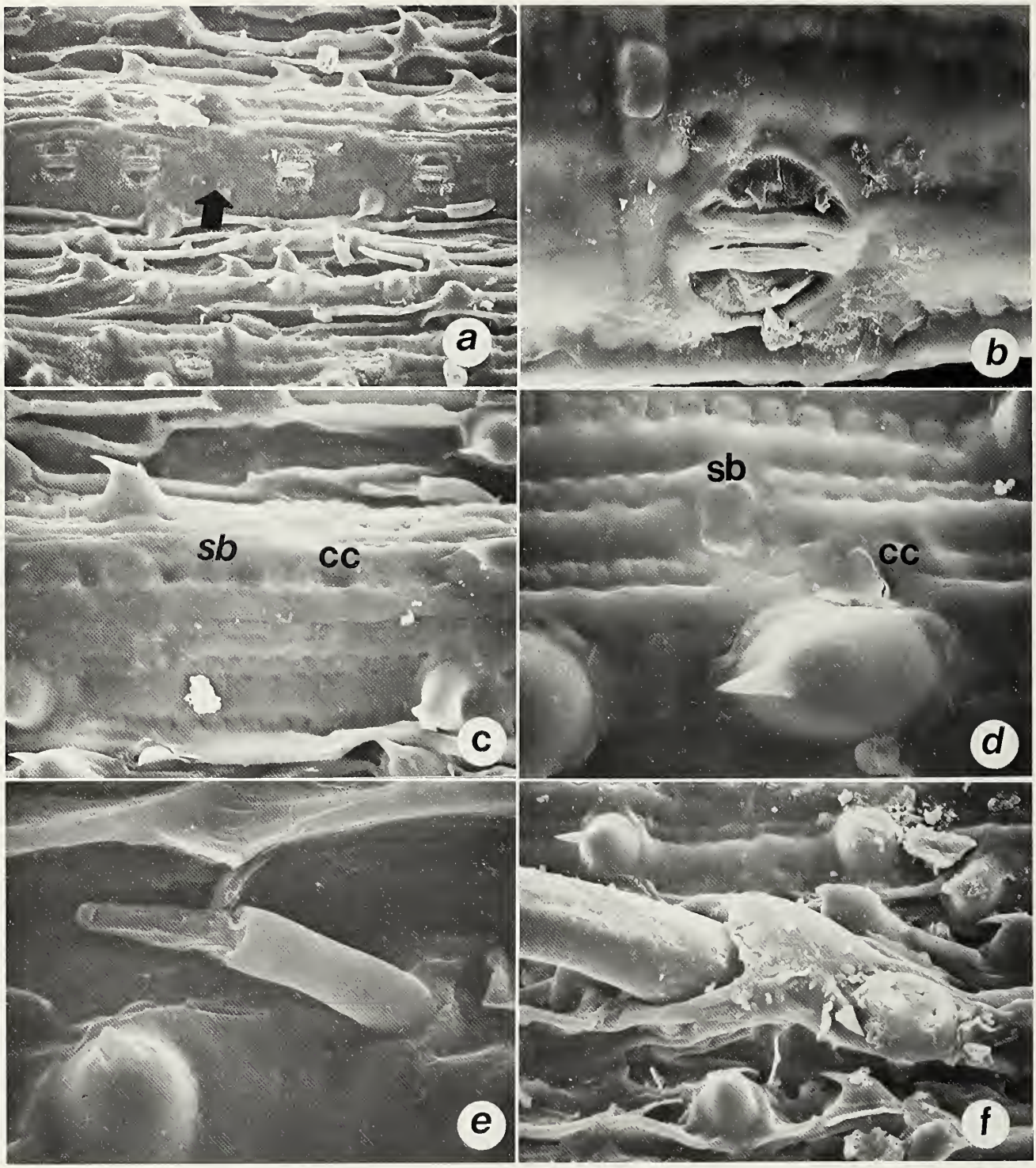

PLATE 3.—Abaxial epidermis *Andropterum stolzii,* Wiehe N/293: *a,* overview, prickles, interstomatal cells (arrow), ×295; *b,* stoma, long cells, ×1250; *c,* costal silica bodies (sb), cork cells (cc), ×625; *d,* intercostal silica bodies (sb), cork cell (cc), prickle, ×1285; *e,* microhair, ×1696; *f,* base of macrohair, ×625.

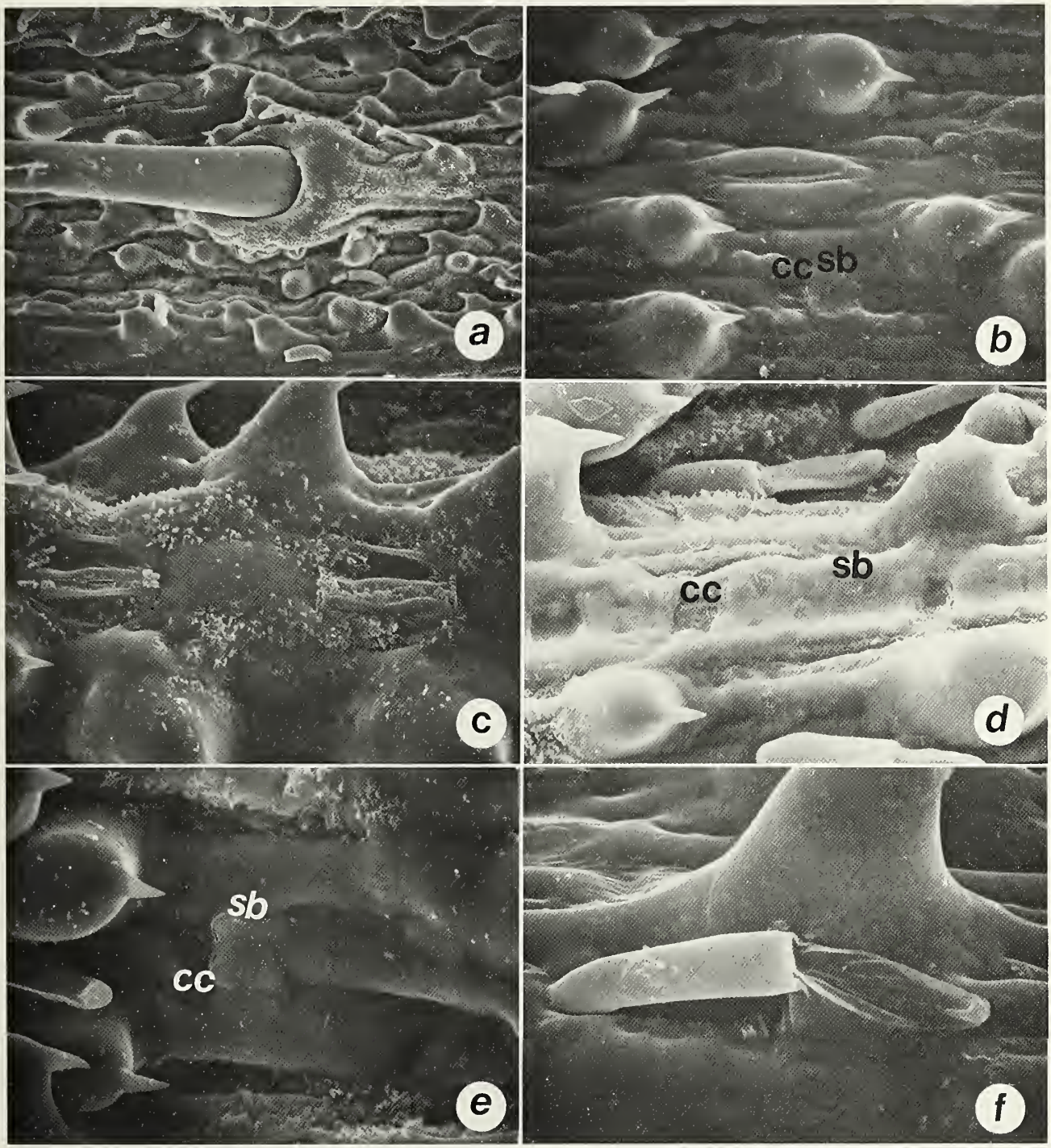

PLATE 4.—Adaxial epidermis *Andropterum stolzii,* Wiehe N/293: *a,* overview, base of macrohair, ×295; *b,* stoma, long cells, prickles, intercostal silica body (sb), cork cell (cc), ×867; *c,* interstomatal cell, ×867; *d,* microhair, costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×1285; *f,* microhair, ×1696.

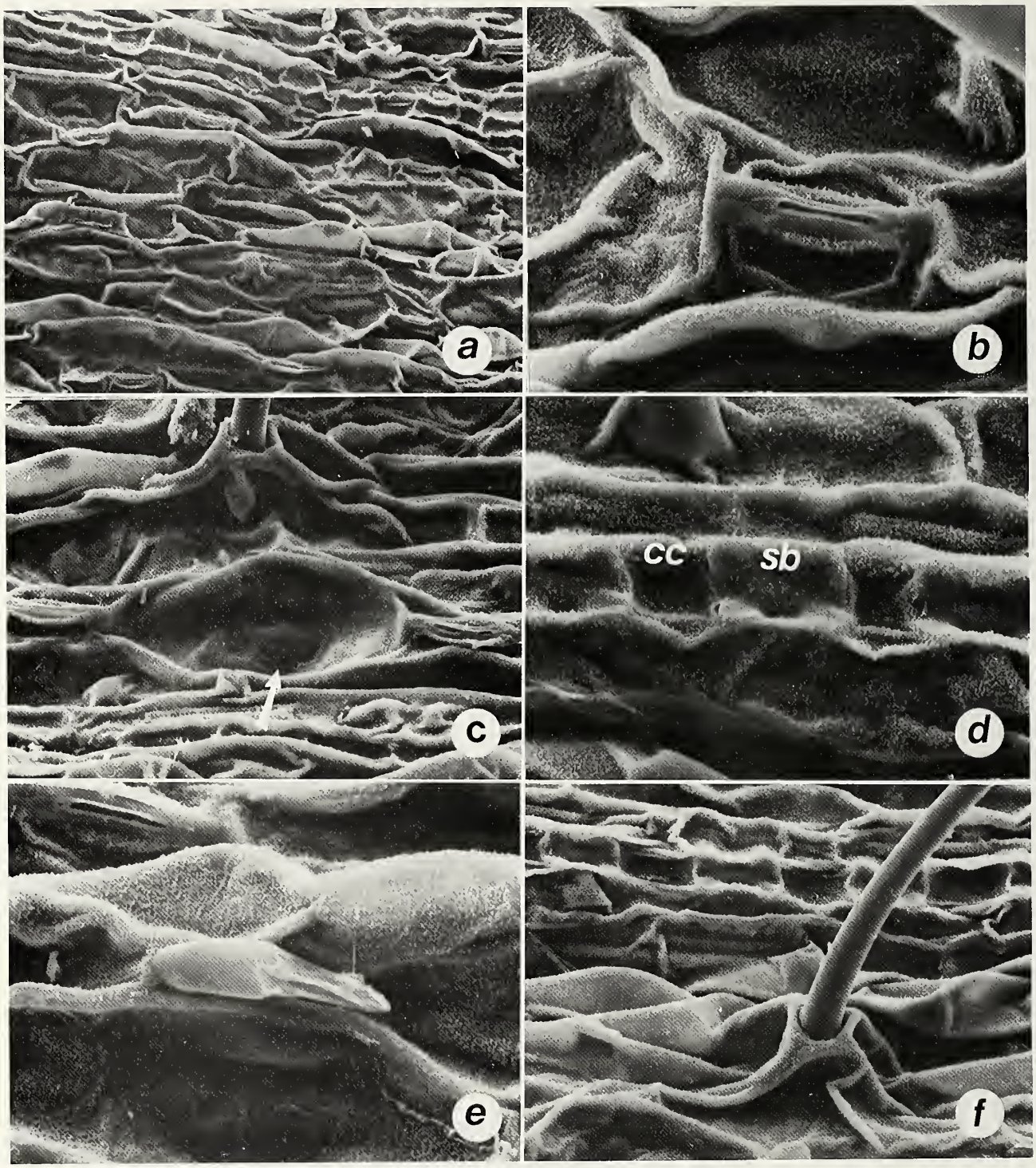

PLATE 5.—Abaxial epidermis *Arthraxon lancifolius*, Milne-Redhead & Taylor 10110: *a*, overview, long cells, ×320; *b*, stoma, ×1250; *c*, interstomatal cell (arrow), ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, microhair, ×1250; *f*, base of macrohair, ×640.

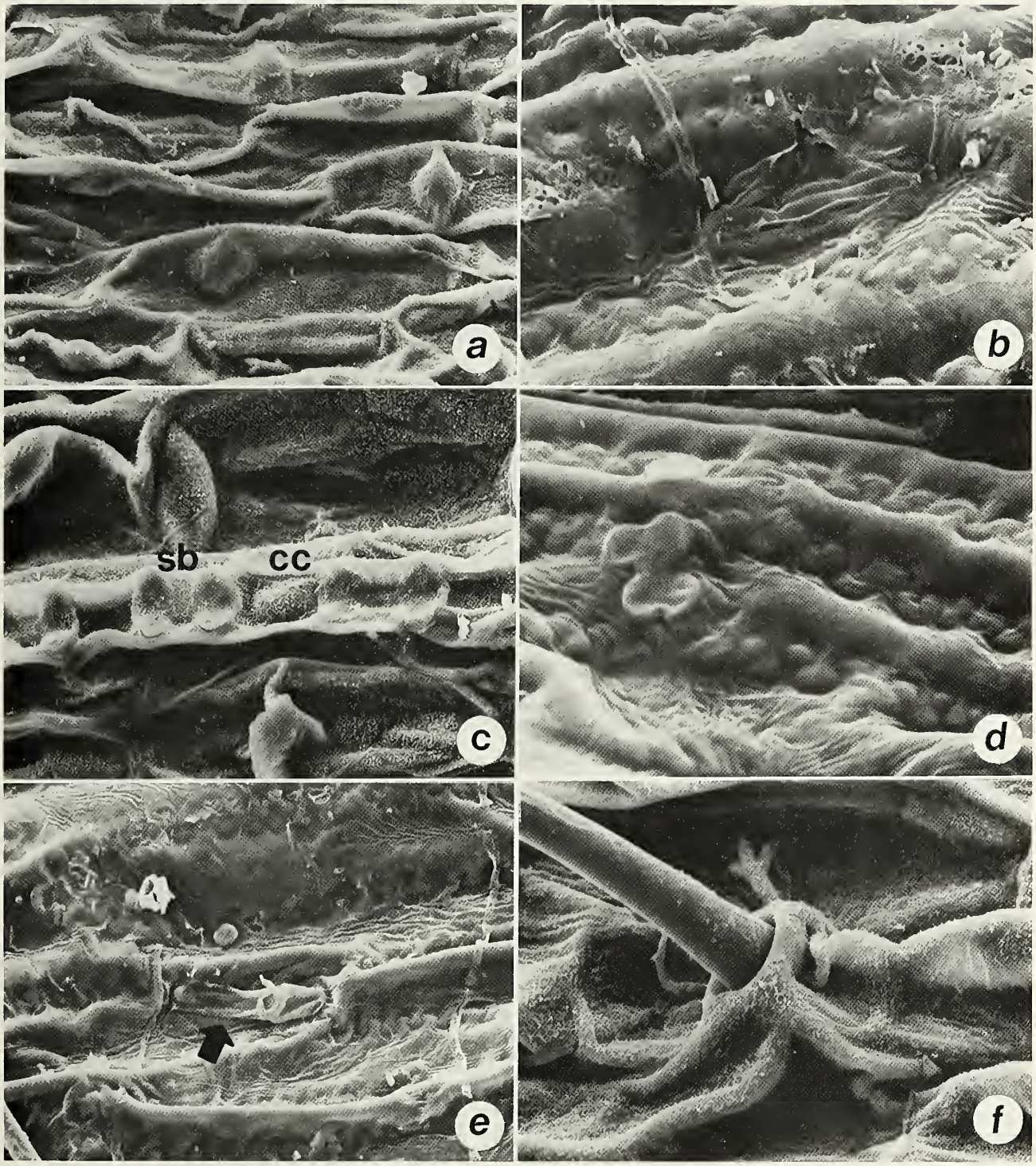

PLATE 6.—Adaxial epidermis *Arthraxon lancifolius*, Milne-Redhead & Taylor 10110: *a*, long cells, ×640; *b*, stoma, ×1250; *c*, costal silica bodies (sb), cork cells (cc), ×640; *d*, intercostal silica body, ×1250; *e*, microhair (arrow), ×640; *f*, base of macrohair, ×1250.

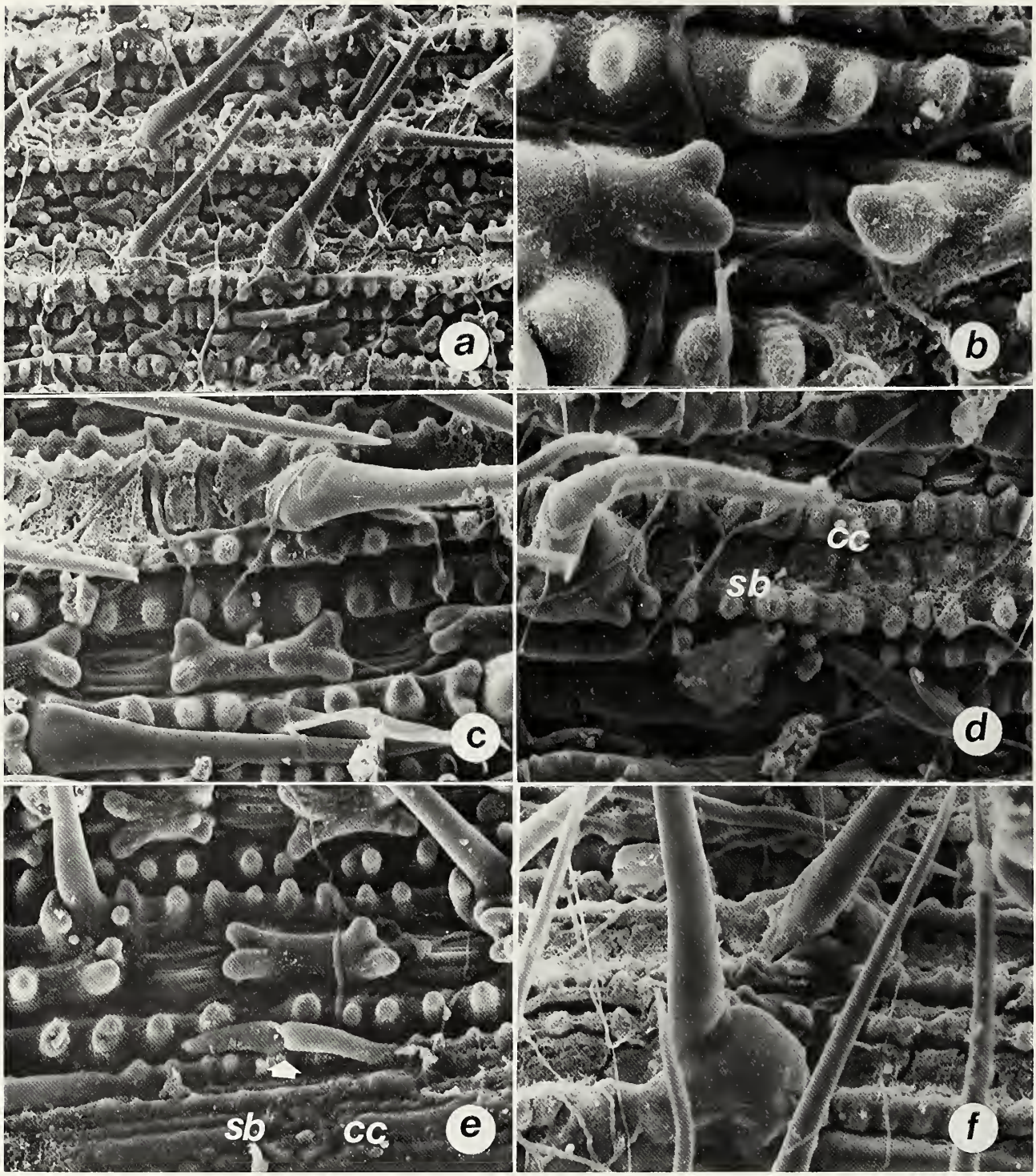

PLATE 7.—Abaxial epidermis *Capillipedium parvifolium,* Greenway 7783: *a,* overview, macrohairs, ×320; *b,* stoma, ×1250; *c,* interstomatal cell, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair (arrow), costal silica bodies (sb), cork cells (cc), ×640; *f,* bases of macrohairs, ×640.

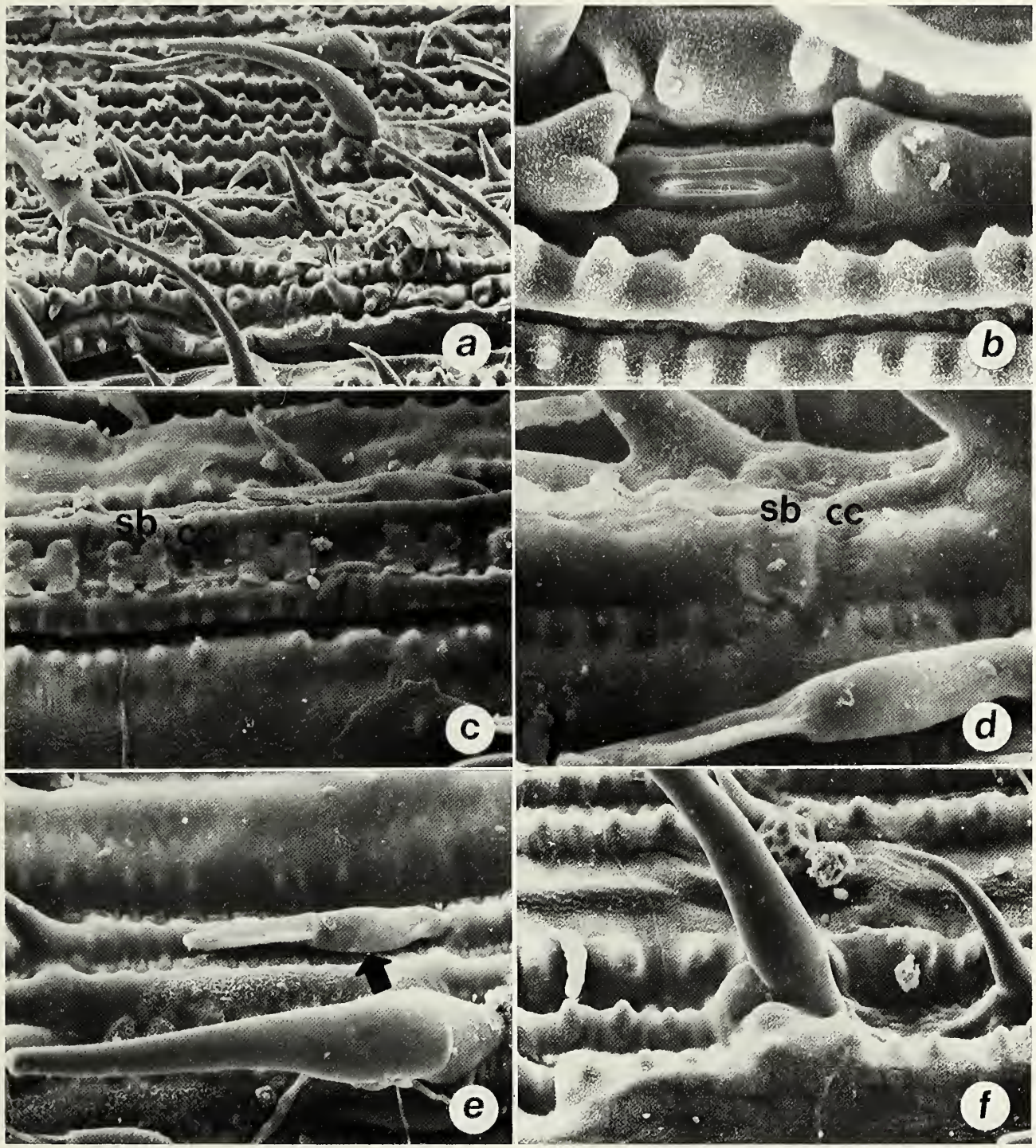

PLATE 8.—Adaxial epidermis *Capillipedium parvifolium*, Greenway 7783: *a*, overview, prickles, ×320; *b*, stoma, long cells, ×1250; *c*, nonpapillate long cells, costal silica bodies (sb), cork cells (cc), ×640; *d*, intercostal silica body (sb), cork cell (cc), ×1250; *e*, microhair (arrow), ×640; *f*, base of macrohair, ×640.

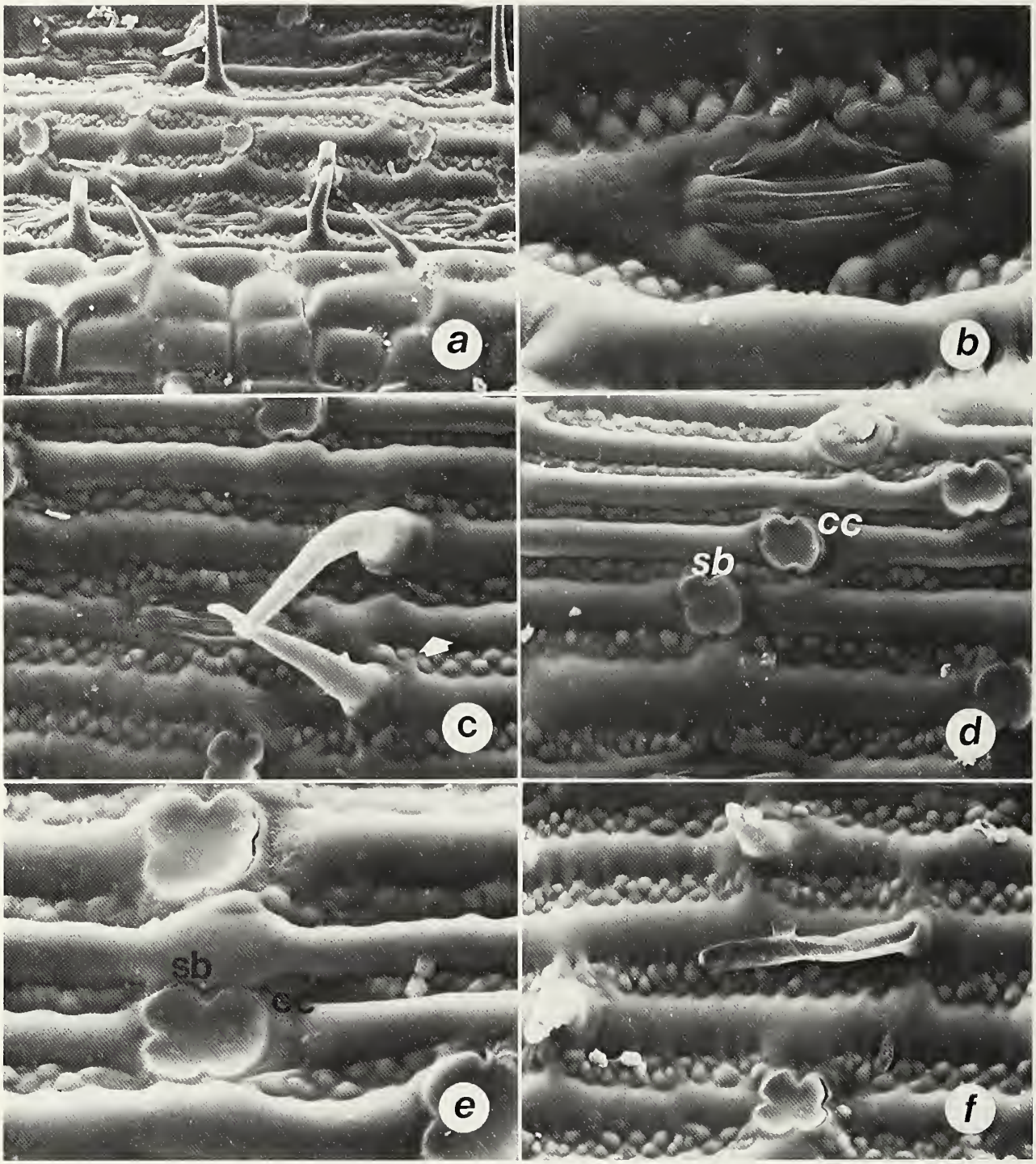

PLATE 9.—Abaxial epidermis *Chrysopogon plumulosus,* Ament & Magogo 324: *a,* overview showing costal zone with inflated cells, ×320; *b,* stoma, ×1250; *c,* long cells, short macrohair-type prickles, intercostal silica body, interstomatal cell (arrow), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* costal silica bodies (sb), cork cells (cc), ×1250; *f,* microhair, ×640.

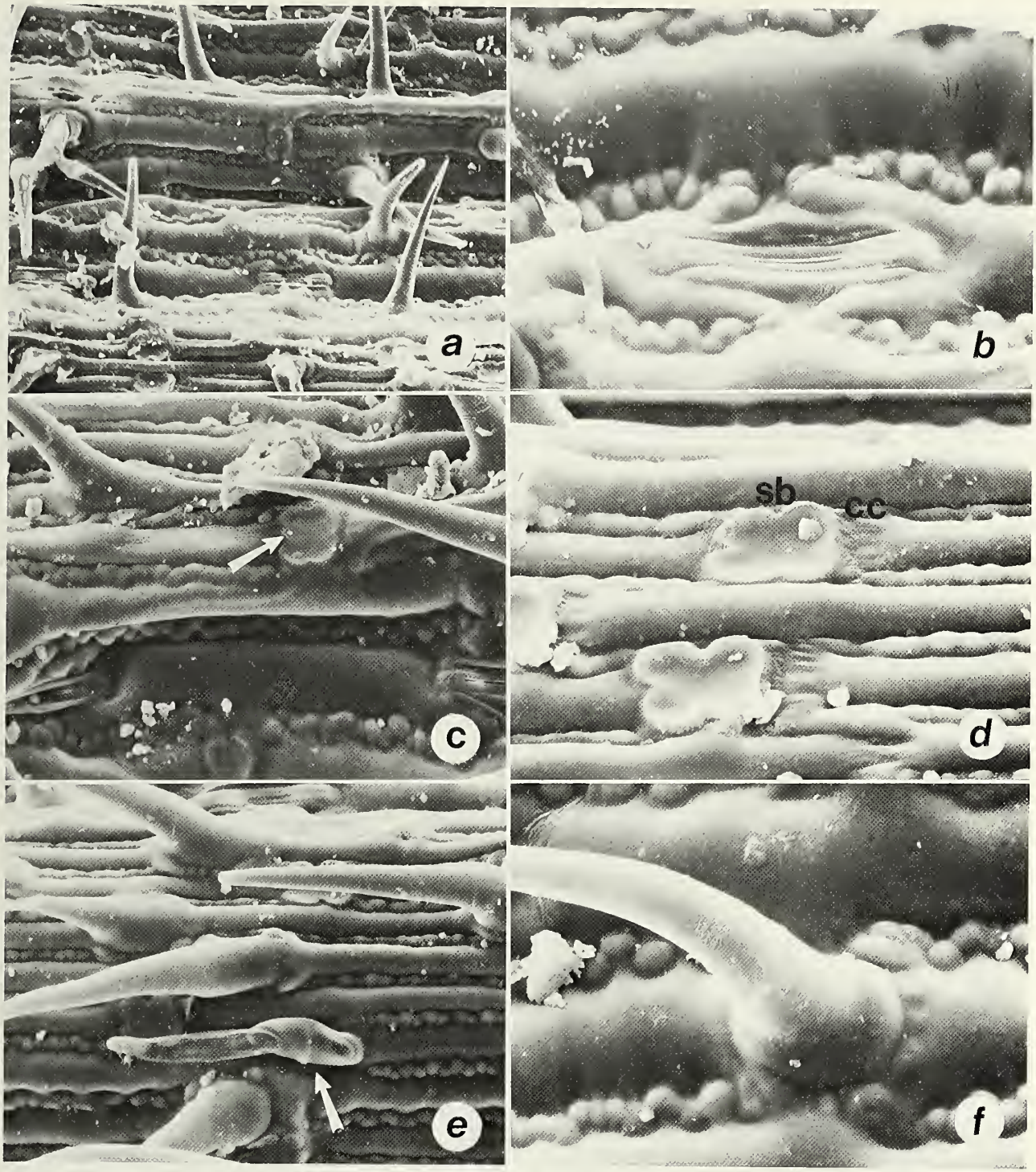

PLATE 10.—Adaxial epidermis *Chrysopogon plumulosus*, Ament & Magogo 324: *a*, overview, short macrohair-type prickles, ×320; *b*, stoma, ×1250; *c*, interstomatal cell, intercostal silica body (arrow), ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, microhair (arrow), macrohairs, ×640; *f*, base of macrohair, ×1250.

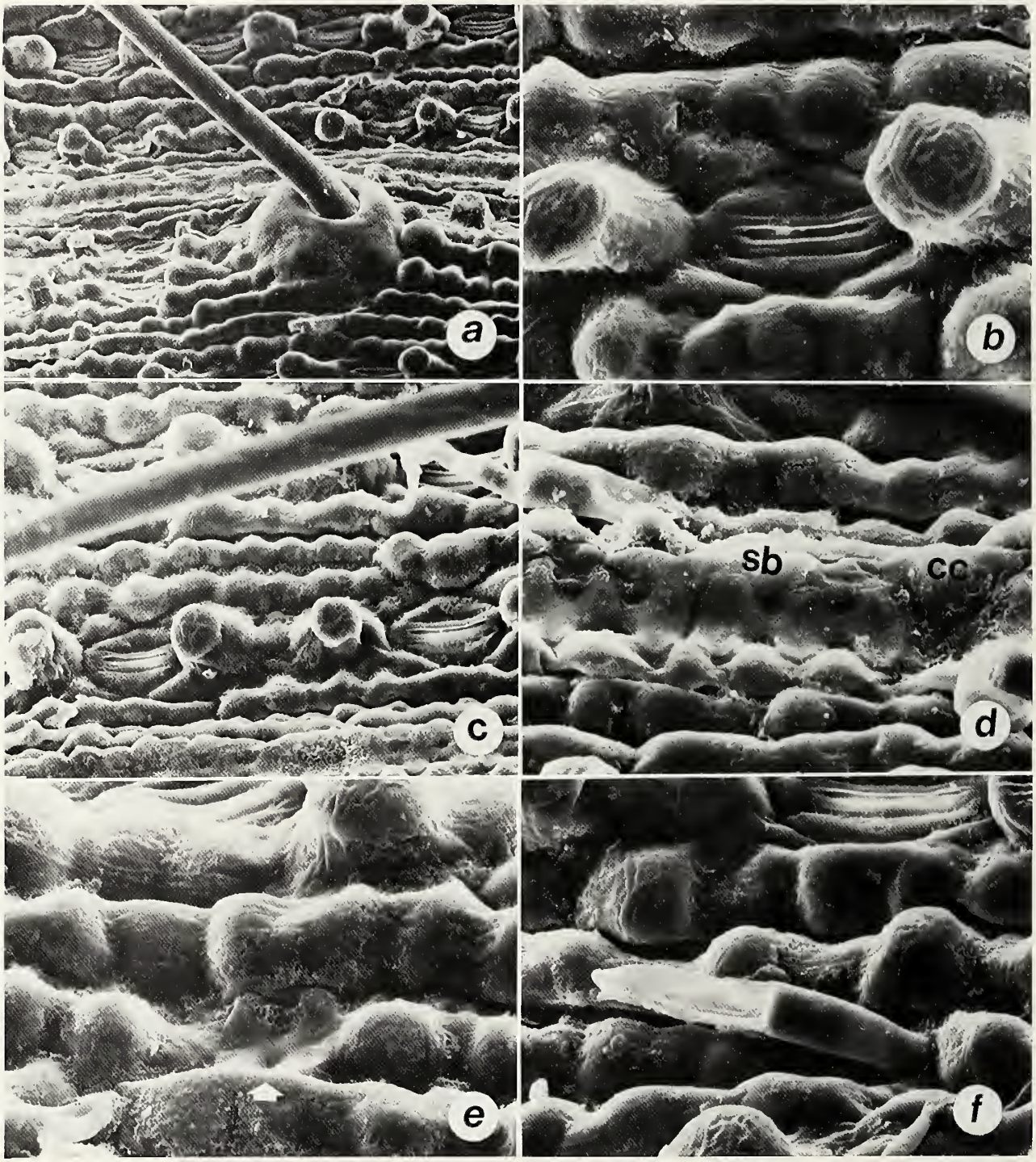

PLATE 11.—Abaxial epidermis *Cleistachne sorghoides*, Bogdan AB2563: *a*, overview, base of macrohair, ×320; *b*, stoma, ×1250; *c*, interstomatal cells, long cells, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, intercostal silica body (arrow), ×1250; *f*, microhair, ×1250.

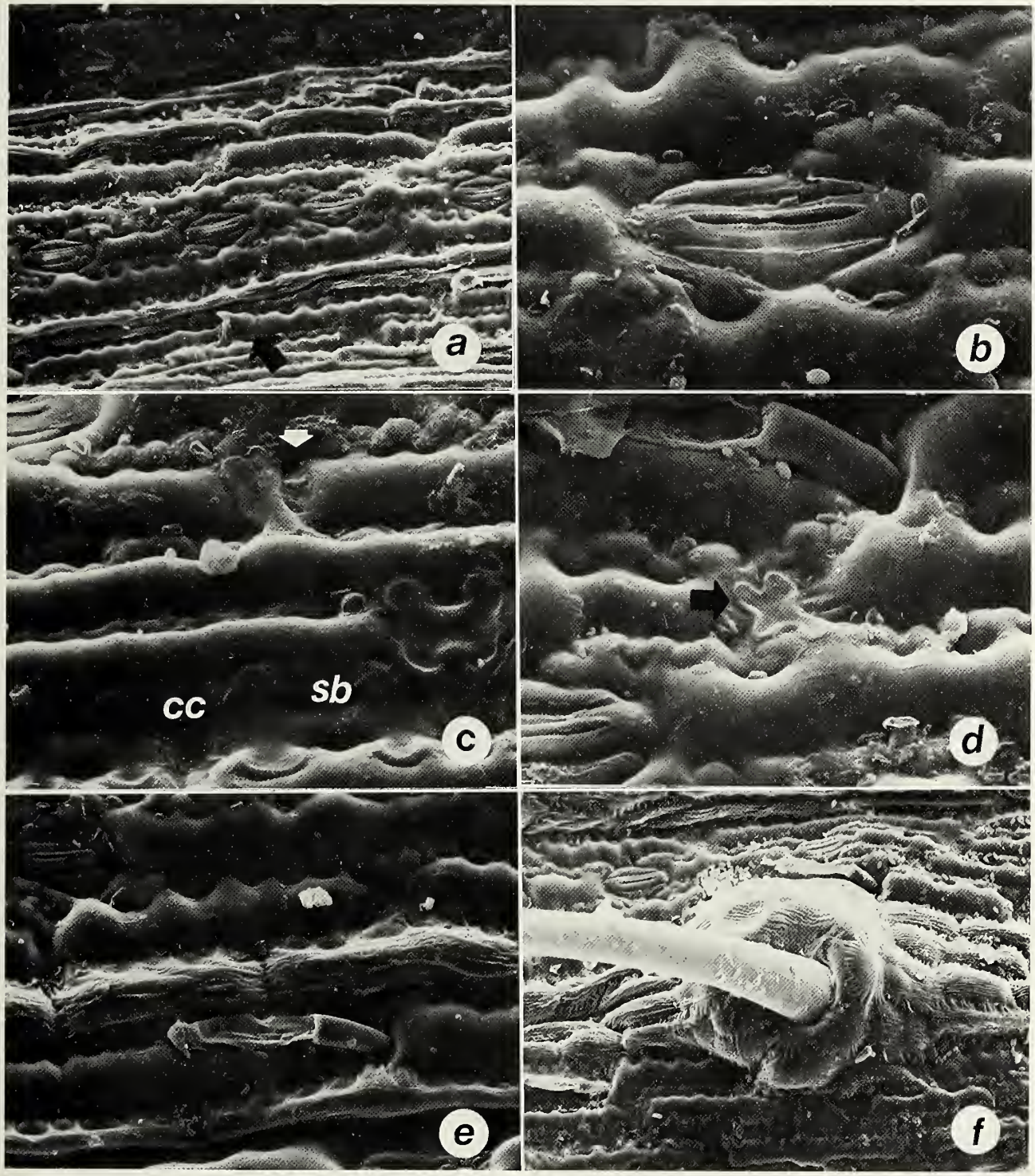

PLATE 12.—Adaxial epidermis *Cleistachne sorghoides*, Bogdan AB2563: *a*, overview, interstomatal cells, long cells, prickle (arrow), ×320; *b*, stoma, ×1250; *c*, intercostal silica bodies, cork cell (arrow), costal silica bodies (sb), cork cells (cc), ×1250; *d*, intercostal silica body (arrow), ×1250; *e*, long cells, microhair, ×640; *f*, base of macrohair, ×320.

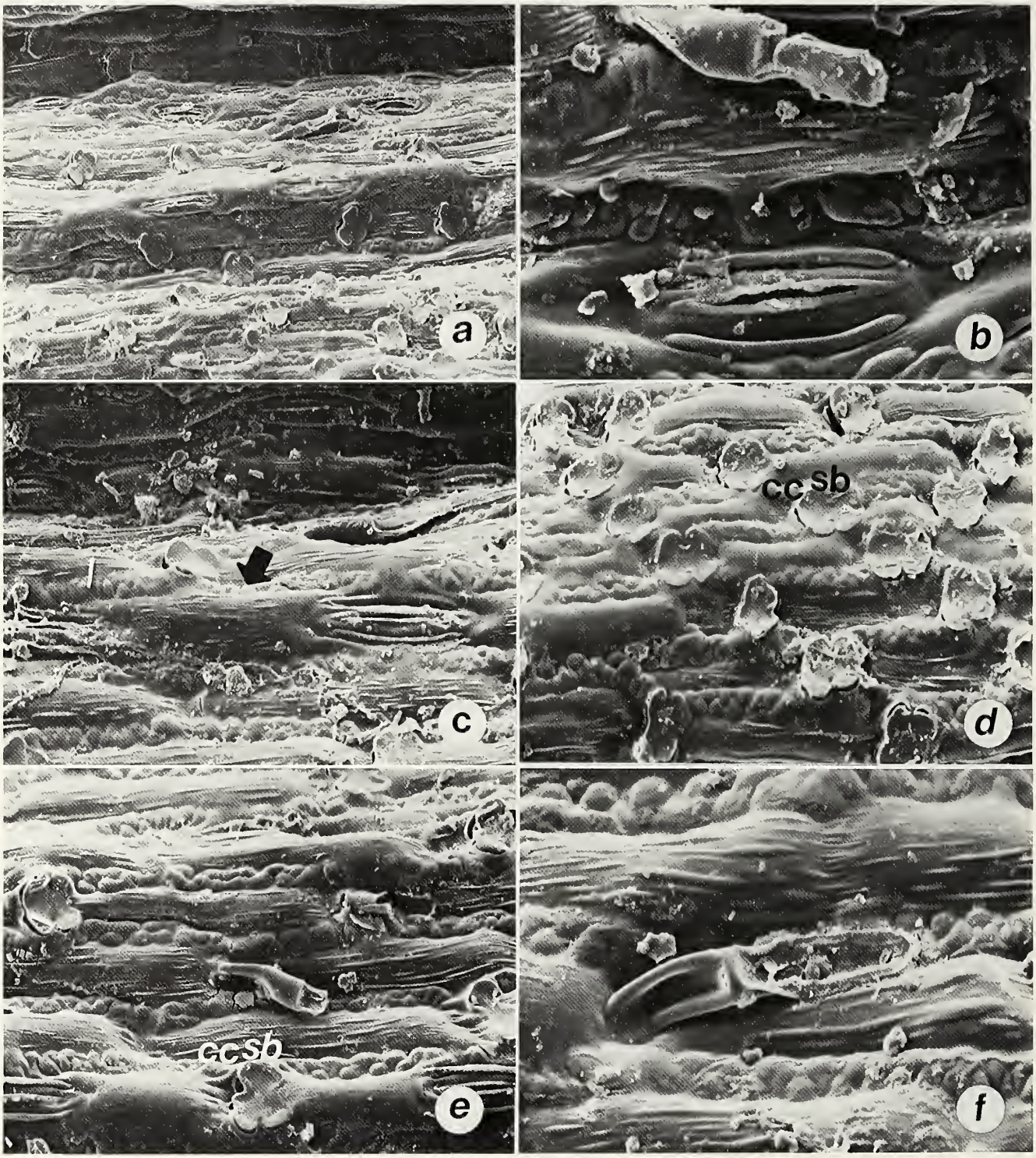

PLATE 13.—Abaxial epidermis *Coelorhachis afraurita,* Eggeling 1843: *a,* overview, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×640; *f,* microhair, horizontal striations on long cells, ×1250.

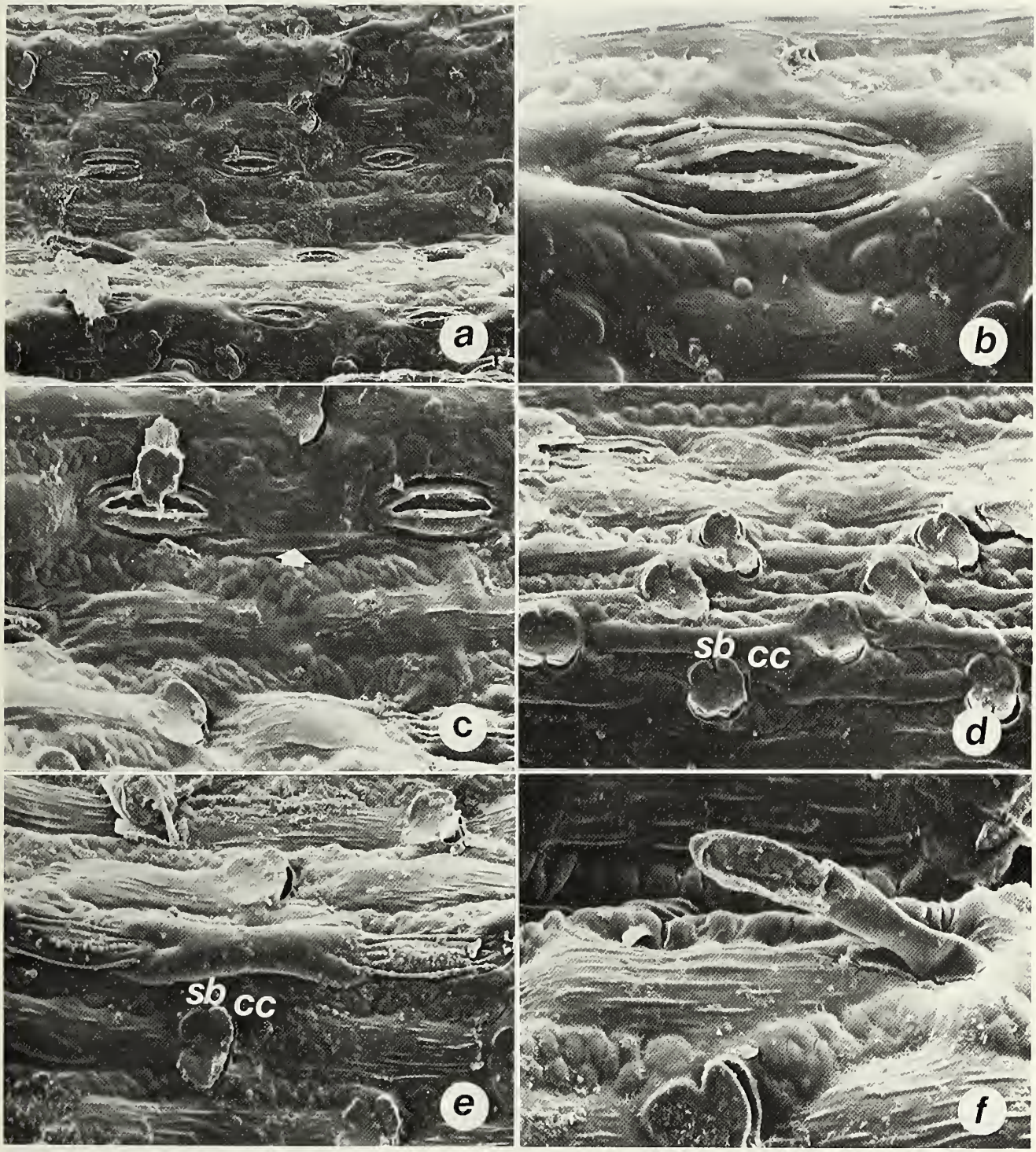

PLATE 14.—Adaxial epidermis *Coelorhachis afraurita,* Eggeling 1843: *a,* overview, interstomatal cells, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica bodies (sb), cork cells (cc), ×640; *f,* microhair, horizontal striations on long cells, ×1250.

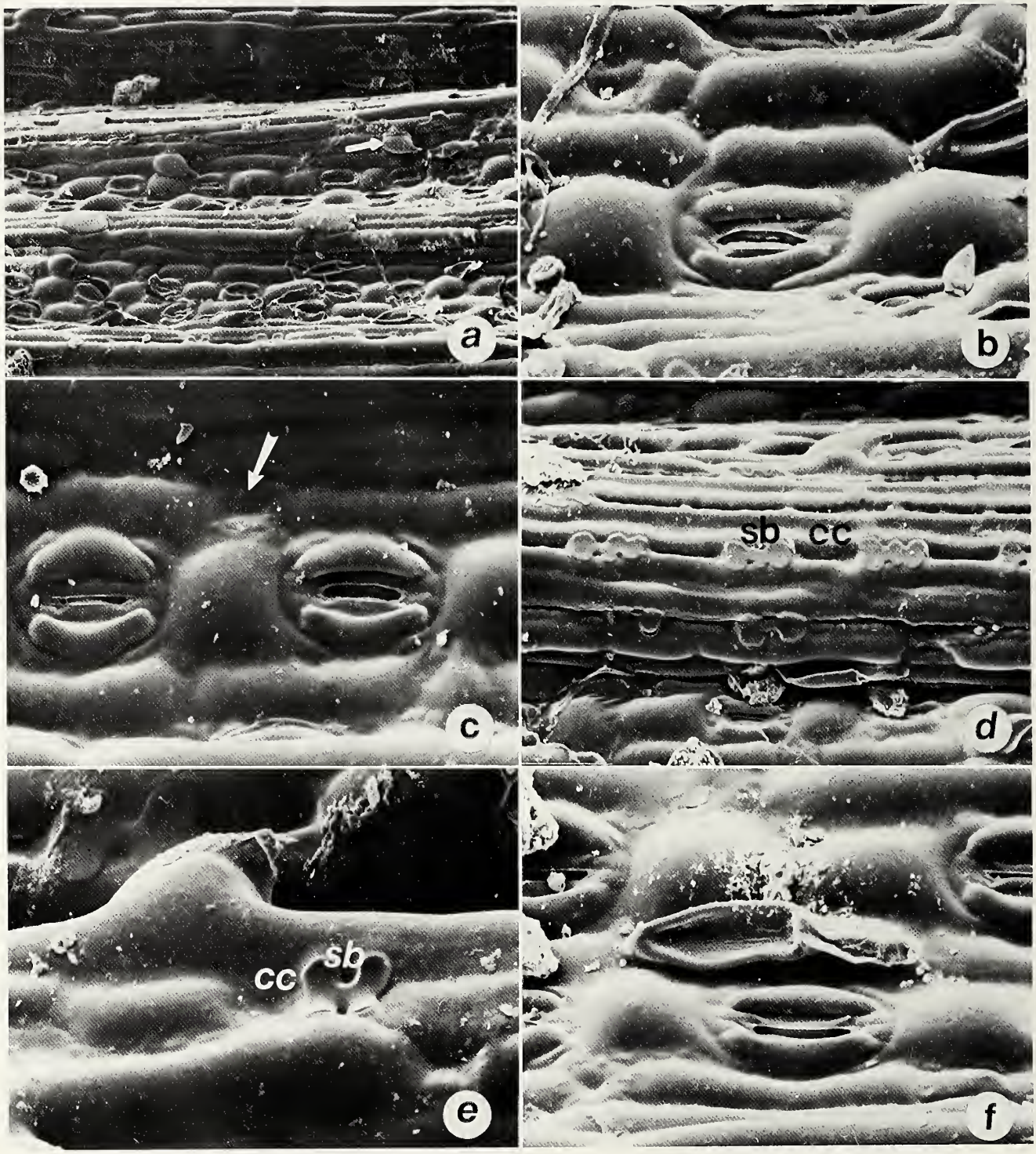

PLATE 15.—Abaxial epidermis *Cymbopogon nardus*, Shantz 119: *a*, overview, prickles (arrow), ×320; *b*, stoma, ×1250; *c*, interstomatal cell, long cells, intercostal cork cell (arrow), ×1250; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×1250; *f*, microhair, ×1250.

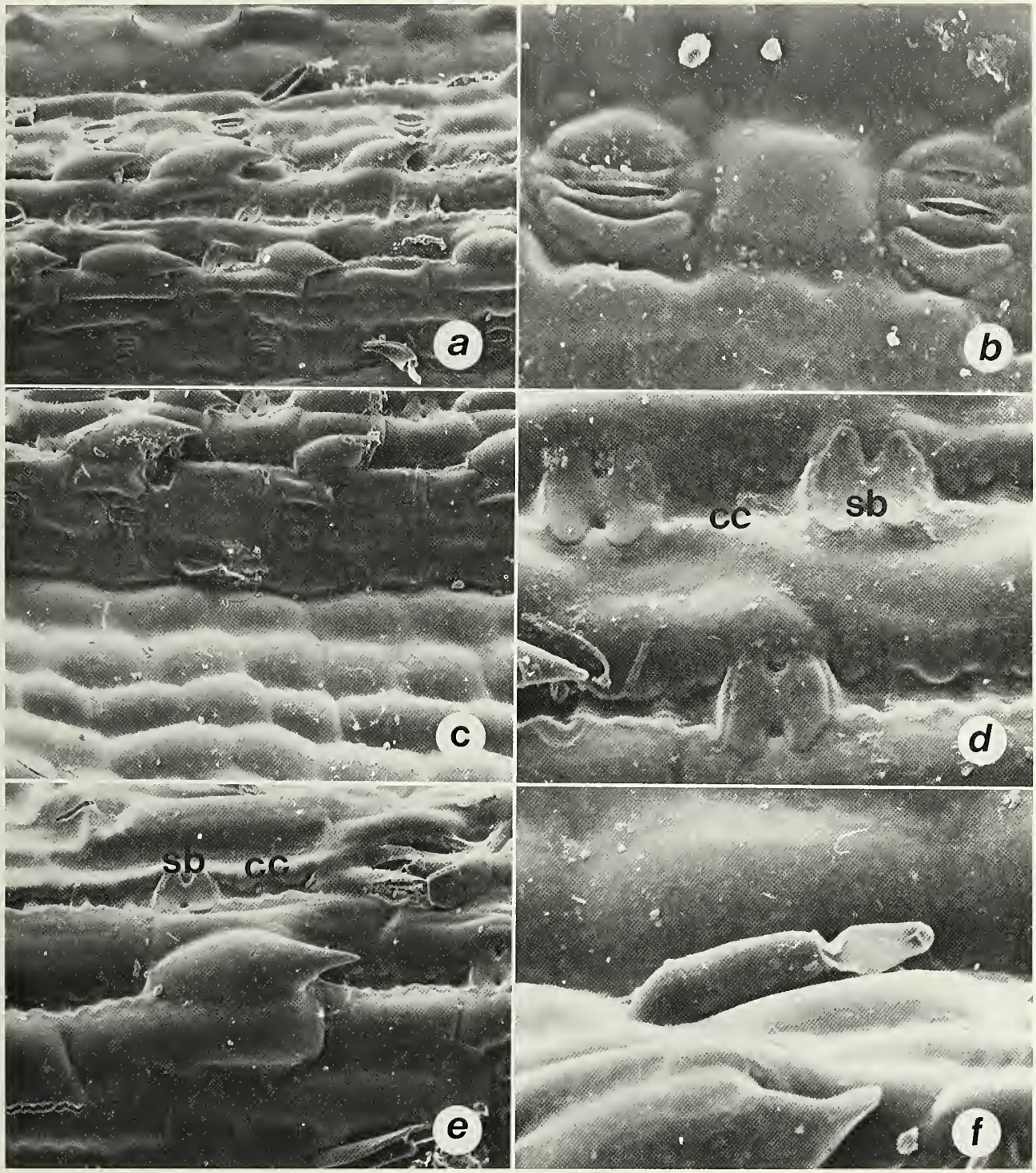

PLATE 16.—Adaxial epidermis *Cymbopogon nardus*, Shantz 119: *a*, overview, long cells, prickles, ×320; *b*, stomata, interstomatal cell, ×1250; *c*, long cells, interstomatal cells, ×320; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, costal silica body (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

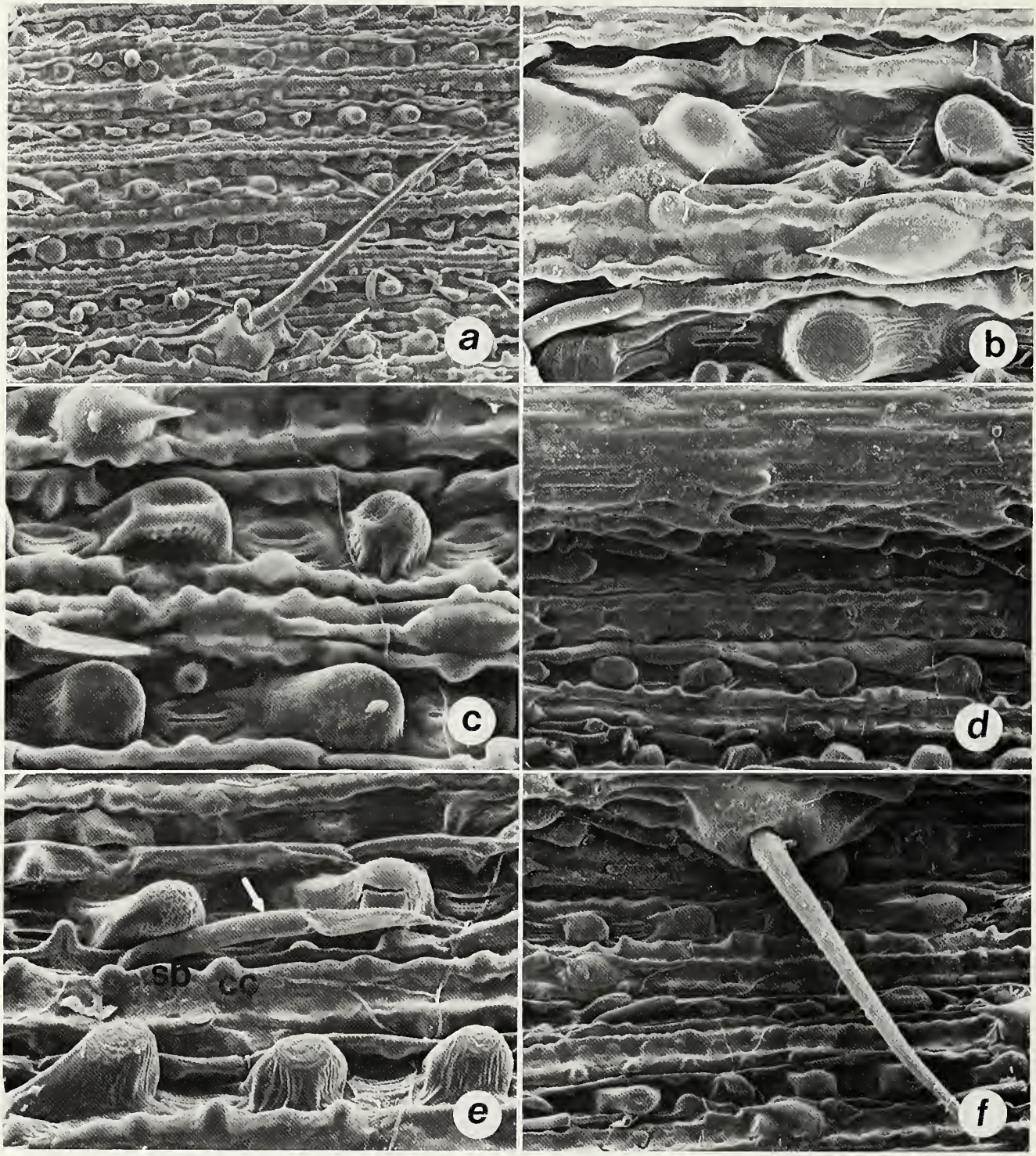

PLATE 17.—Abaxial epidermis *Dichanthium annulatum*, Renvoize & Abdallah 1802: *a*, overview, macrohair, ×160; *b*, stomata, ×640; *c*, interstomatal cells, ×640; *d*, long cells, costal zone, ×640; *e*, costal silica bodies (sb), cork cells (cc), microhair (arrow), ×640; *f*, macrohair, ×320.

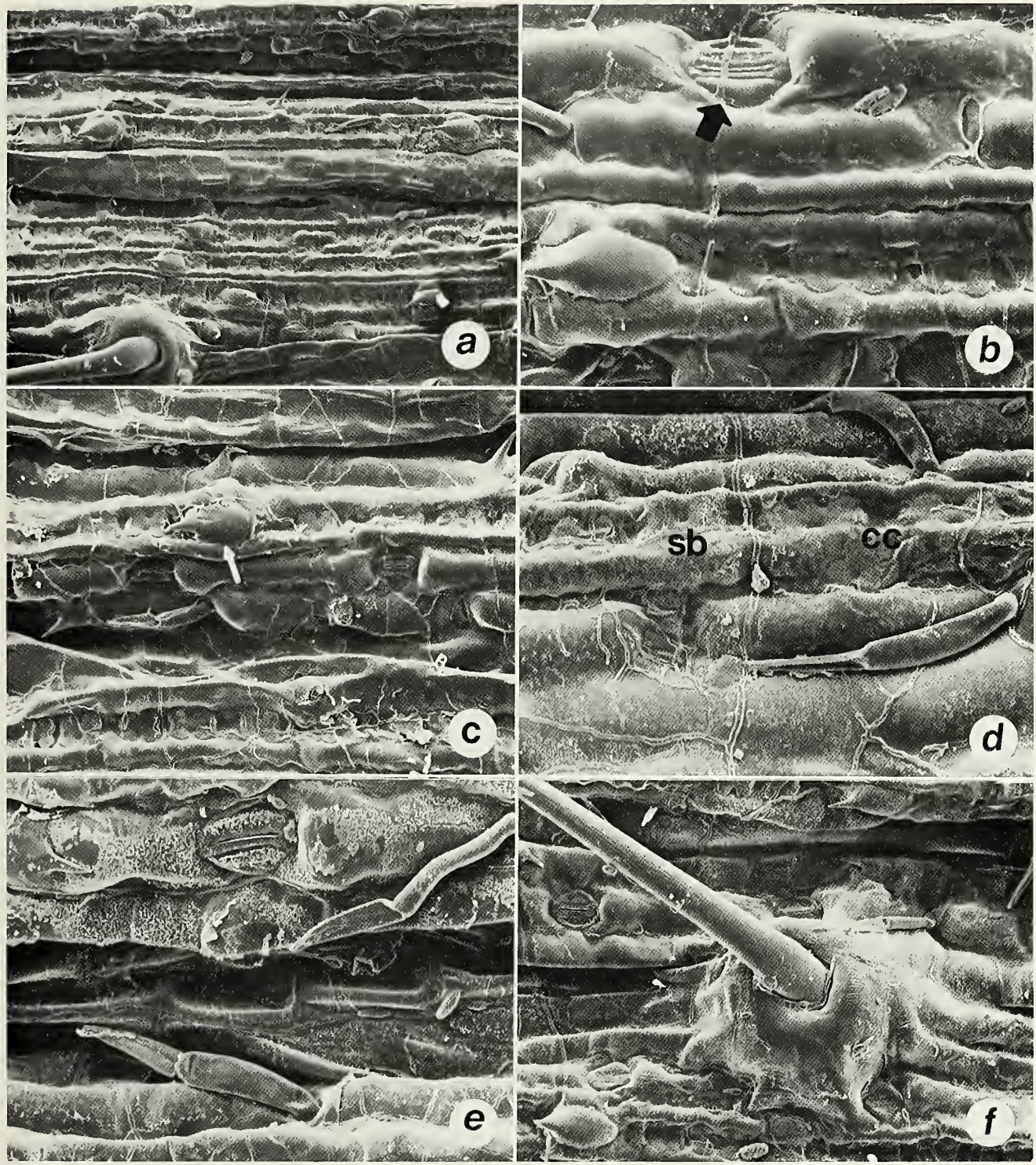

PLATE 18.—Adaxial epidermis *Dichanthium annulatum*, Renvoize & Abdallah 1802: *a*, overview, ×160; *b*, stoma (arrow), ×640; *c*, long cells, costal prickle (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, microhairs, ×640; *f*, base of macrohair, ×320.

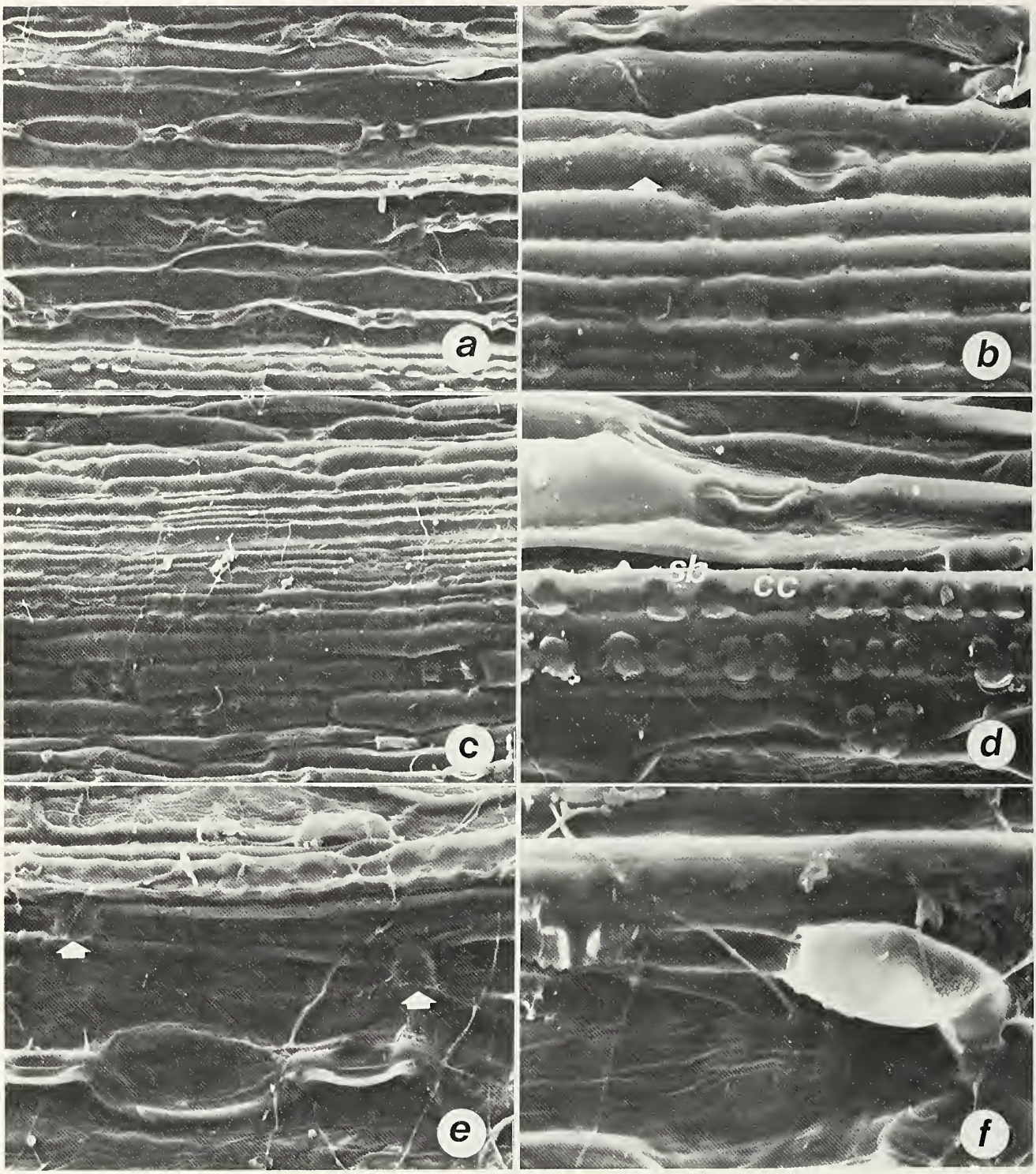

PLATE 19.—Abaxial epidermis *Diheteropogon amplectens* var. *catangensis*, Schlieben 3967: *a*, overview, long cells, ×320; *b*, stoma, interstomatal cell (arrow), ×640; *c*, long cells, interstomatal cells, ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica bodies (arrows), ×640; *f*, microhair, ×1250.

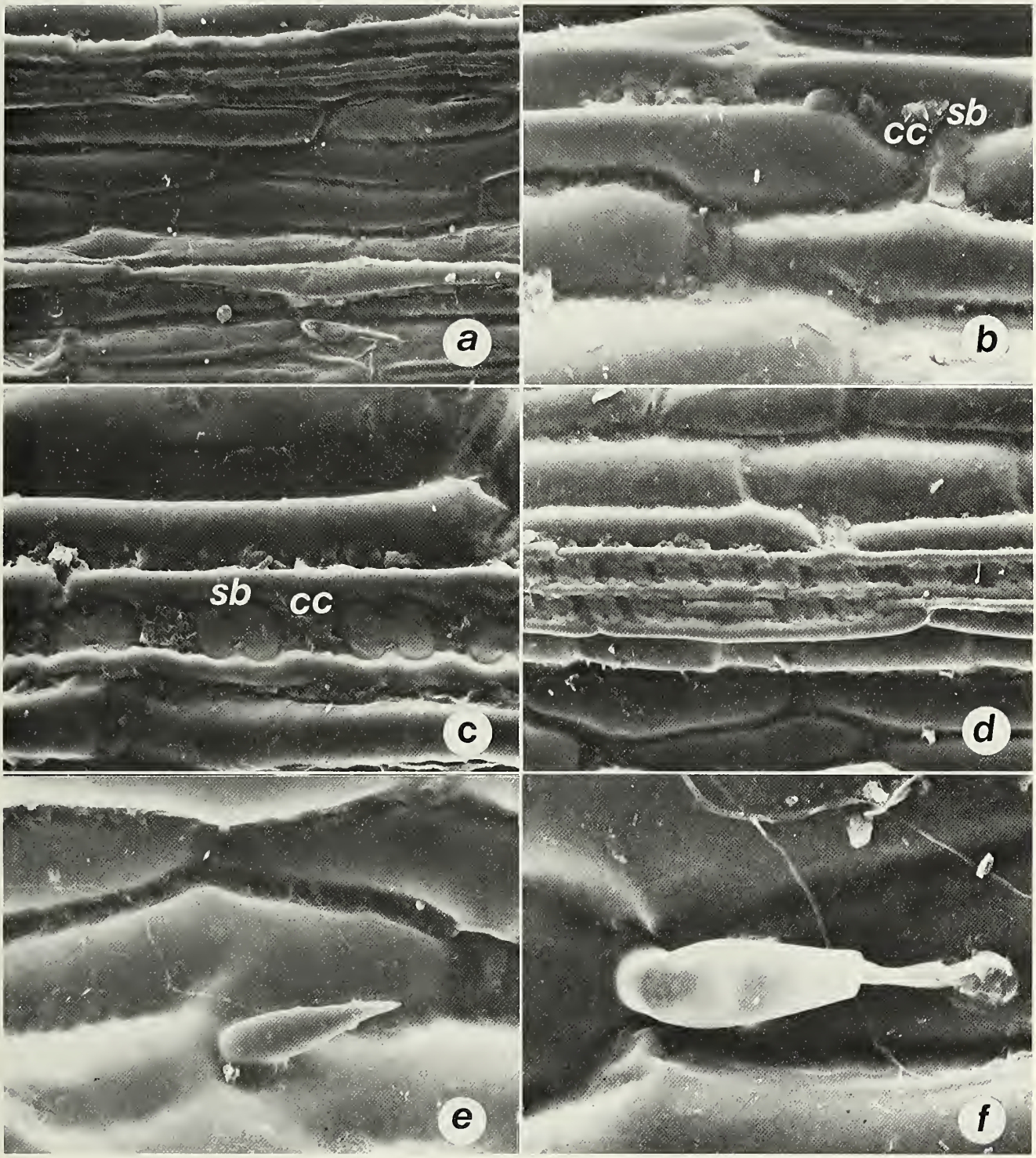

PLATE 20.—Adaxial epidermis *Diheteropogon amplectens* var. *catangensis,* Schlieben 3967: *a,* overview, long cells, ×320; *b,* intercostal silica body (sb), cork cells (cc), ×640; *c,* costal silica bodies (sb), cork cells (cc), ×640; *d,* long cells, costal silica bodies and cork cells, ×320; *e,* intercostal prickle, ×640; *f,* microhair, ×1250.

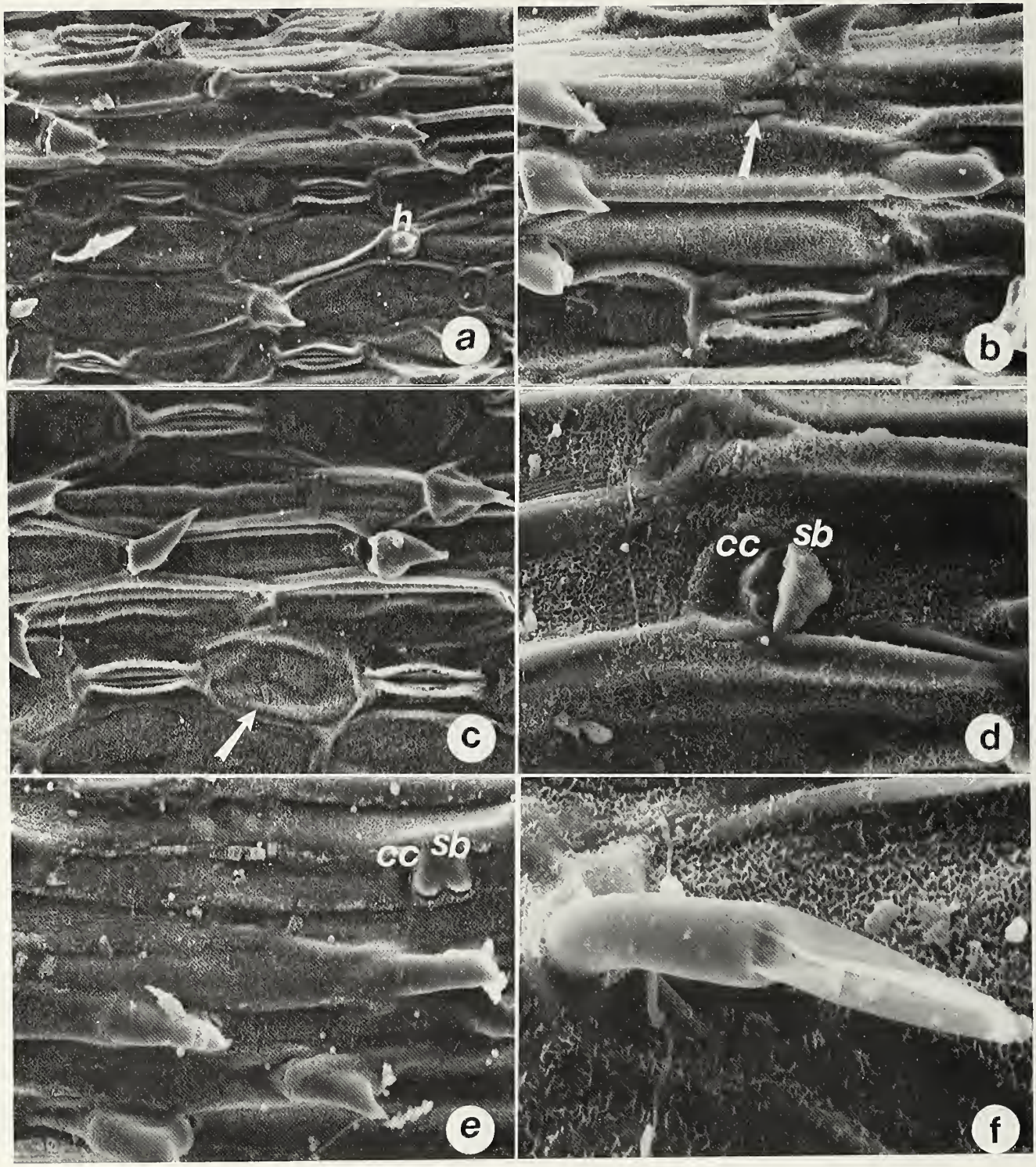

PLATE 21.—Abaxial epidermis *Elionurus tripsacoides*, Mitchell 13/01: *a*, overview, long cells, interstomatal cells, intercostal hook (h), ×352; *b*, stoma, costal papillate cork cell (arrow), ×704; *c*, interstomatal cell (arrow), costal prickles, ×528; *d*, costal silica body (sb), cork cell (cc), ×1056; *e*, costal silica bodies (sb), cork cells (cc), ×704; *f*, microhair, ×1375.

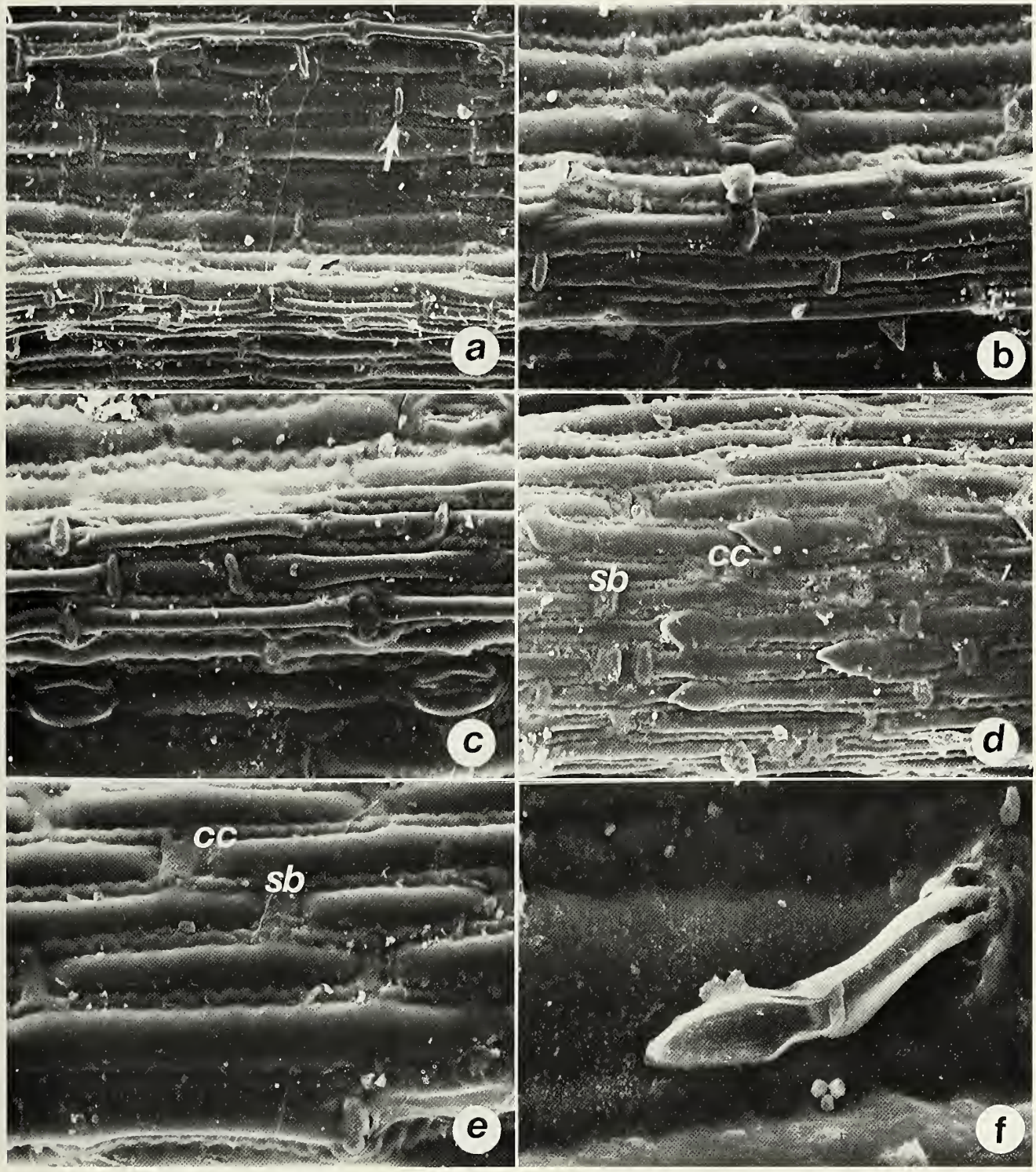

PLATE 22.—Adaxial epidermis *Elionurus tripsacoides*, Mitchell 13/01: *a*, overview, long cells, intercostal silica bodies (arrow) ×176; *b*, stoma, long cells, ×352; *c*, interstomatal cell, intercostal silica bodies, cork cells, ×352; *d*, costal silica bodies (sb), cork cells (cc), ×352; *e*, costal silica bodies (sb), cork cells (cc), ×528; *f*, microhair, ×1375.

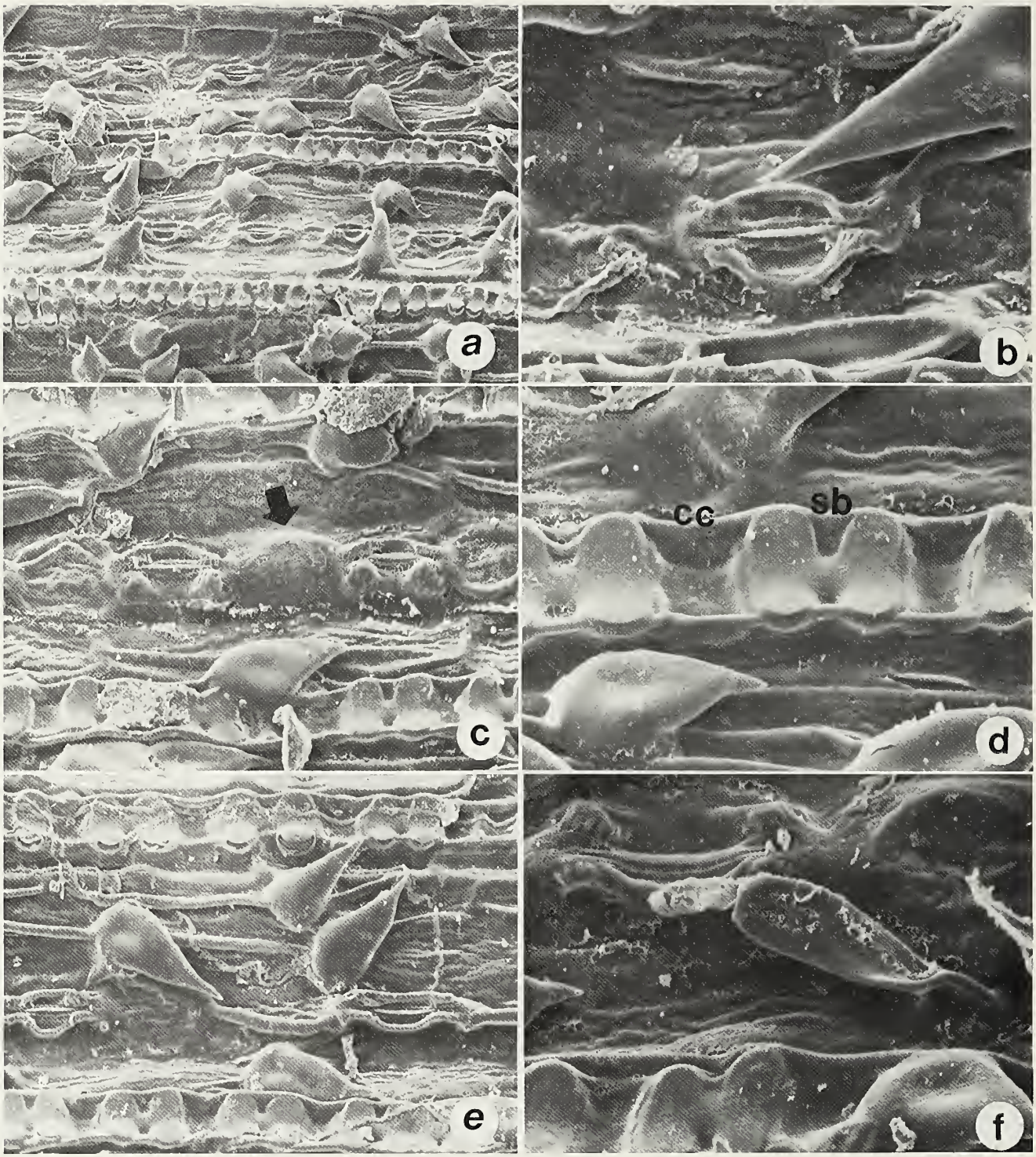

PLATE 23.—Abaxial epidermis *Elymandra grallata,* Salubeni 443: *a,* overview, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×1250; *e,* intercostal prickles, ×640; *f,* microhair, ×1250.

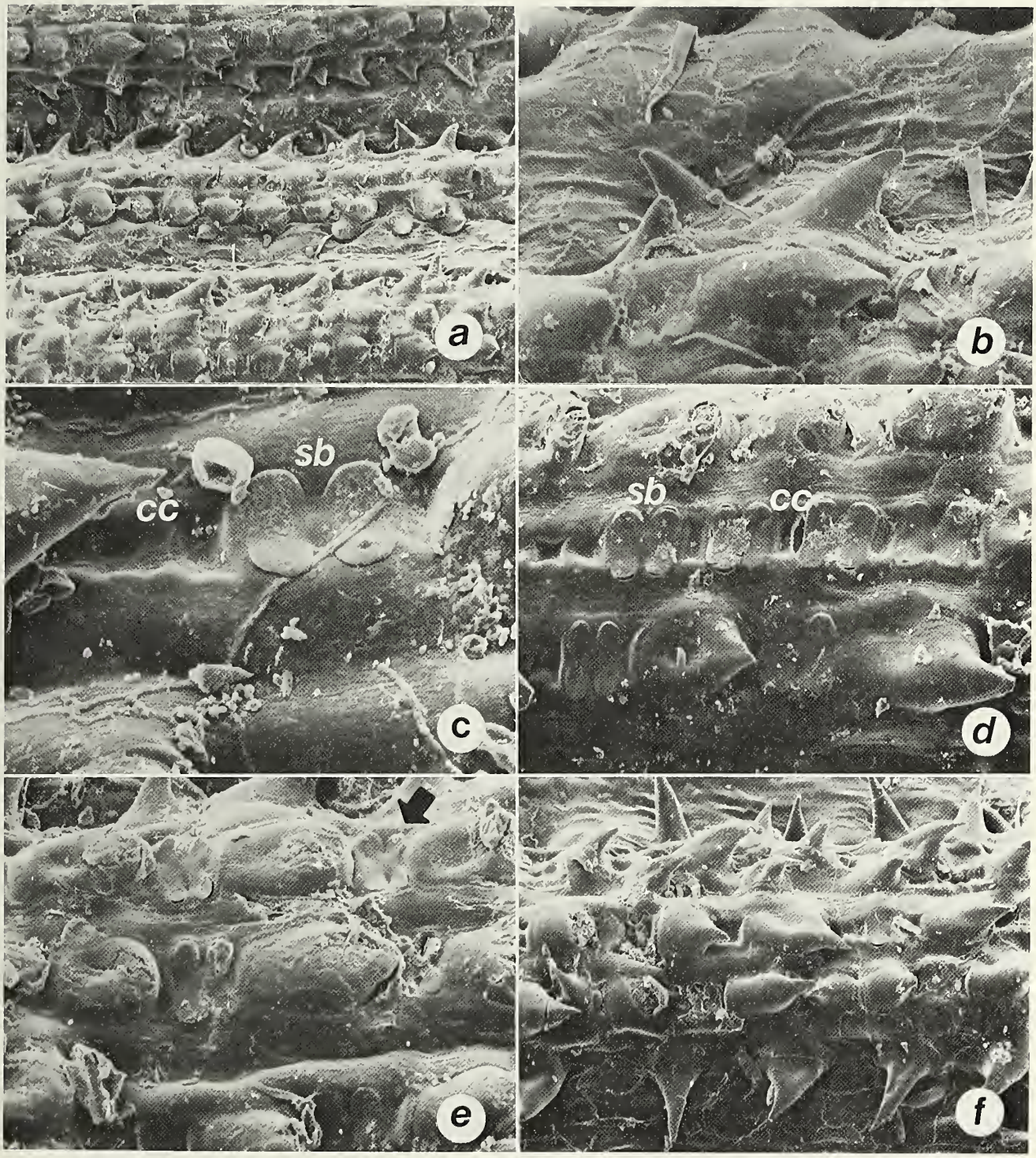

PLATE 24.—Adaxial epidermis *Elymandra grallata,* Salubeni 443: *a,* overview, prickles, ×160; *b,* long cells, ×640; *c,* costal silica body (sb), cork cell (cc), ×1250; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* costal silica bodies (arrow), ×640; *f,* costal and intercostal prickles, ×320.

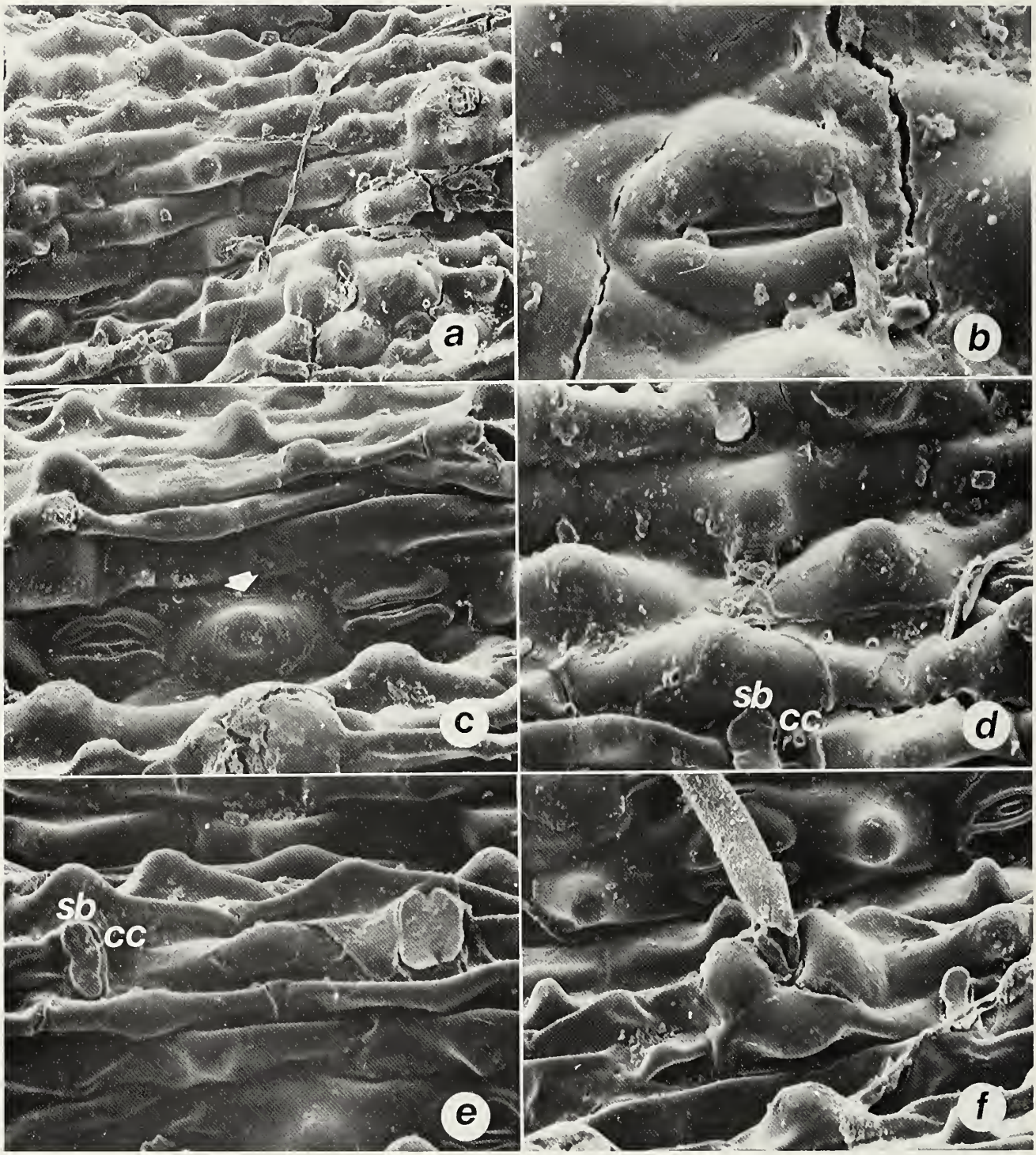

PLATE 25.—Abaxial epidermis *Eriochrysis pallida,* Lewalle 3938: *a,* overview, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), long cells, ×640; *d,* intercostal silica body (sb), cork cell (cc), ×640; *e,* intercostal or costal (?) silica body (sb), cork cell (cc), ×640; *f,* base of macrohair, ×640.

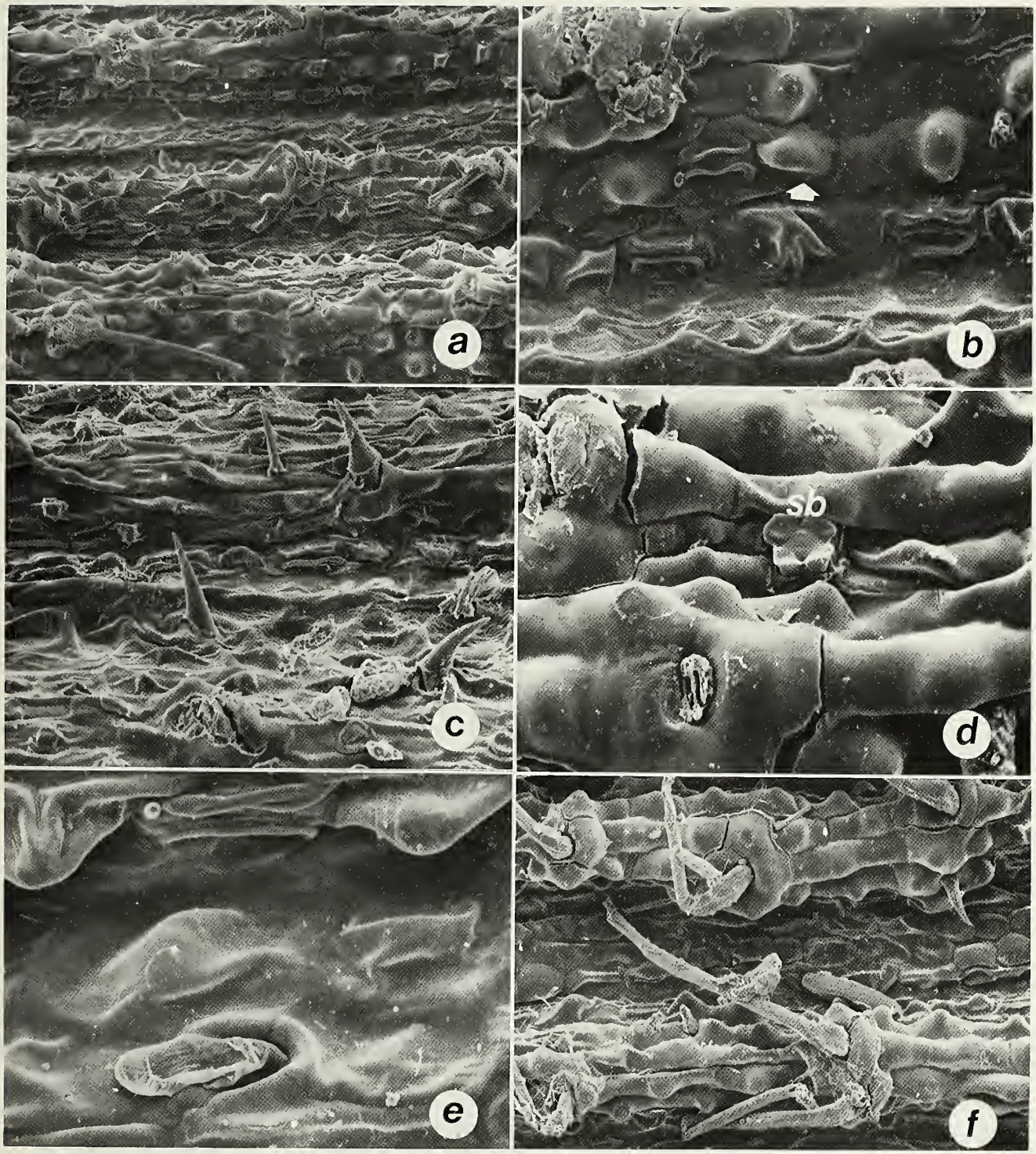

PLATE 26.—Adaxial epidermis *Eriochrysis pallida,* Lewalle 3938: *a,* overview, long cells, ×240; *b,* stomata, interstomatal cells (arrow), ×640; *c,* long cells, prickles, ×480; *d,* costal(?) silica body (sb), ×640; *e,* microhair, ×1250; *f,* macrohairs, ×320.

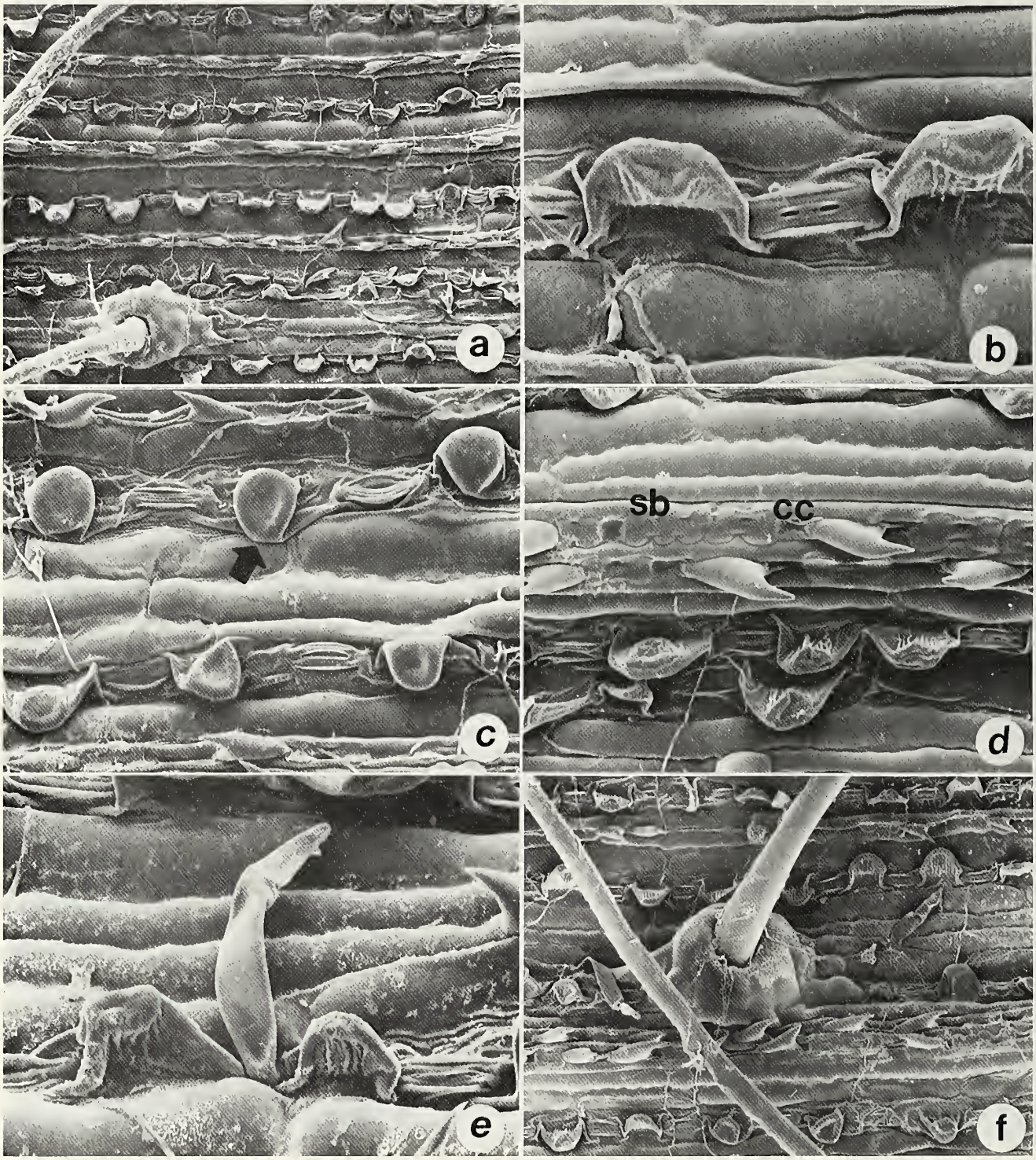

PLATE 27.—Abaxial epidermis *Euclasta condylotricha,* Kahurananga 2663: *a,* overview, interstomatal cells, ×240; *b,* stoma, ×1250; *c,* interstomatal cells (arrow), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

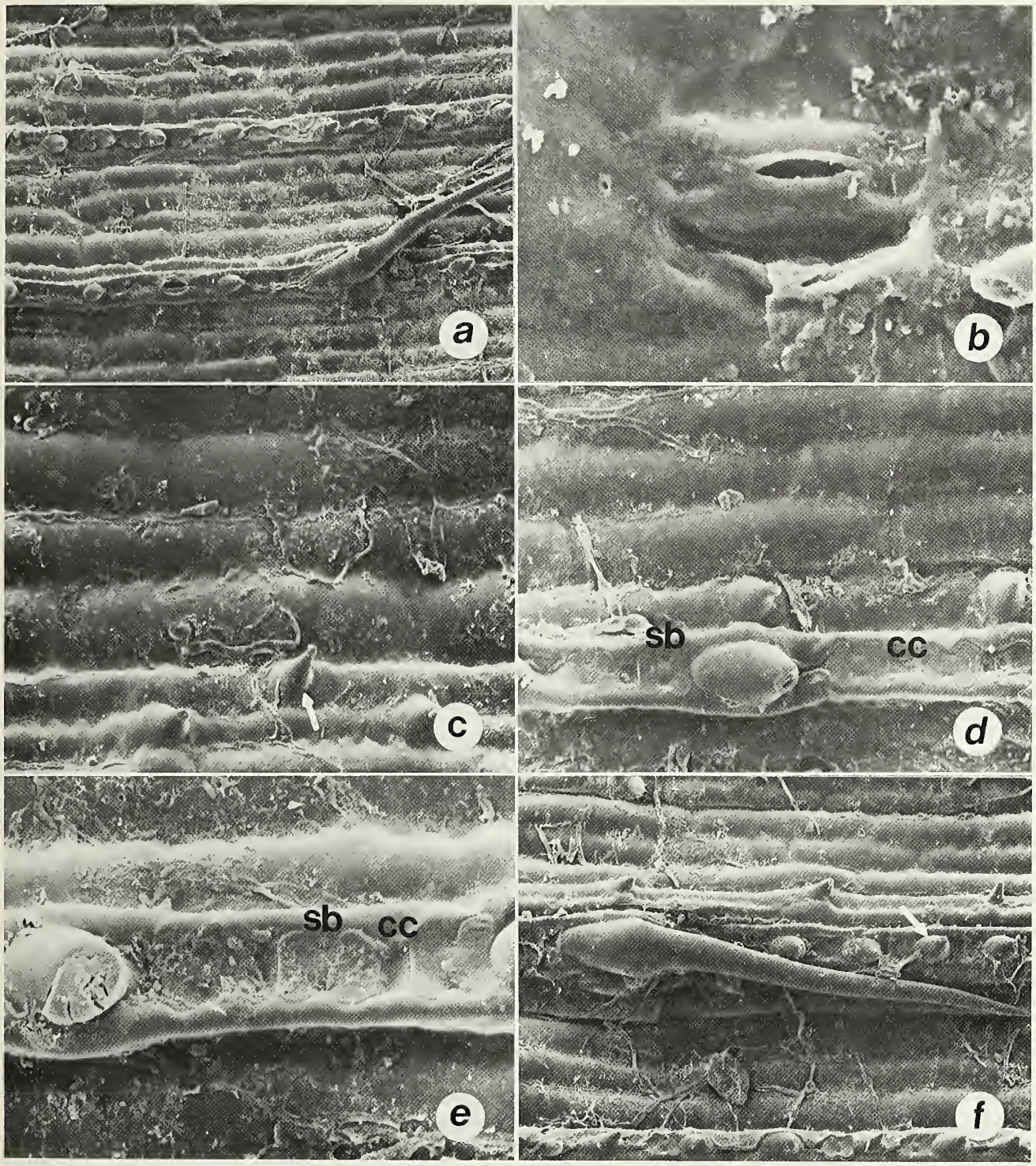

PLATE 28.—Adaxial epidermis *Euclasta condylotricha,* Kahurananga 2663: *a,* overview, long cells, ×240; *b,* stoma, ×2500; *c,* long cells, intercostal hooks (arrow), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* costal silica bodies (sb), cork cells (cc), ×1250; *f,* costal macrohair, prickles (arrow), ×320.

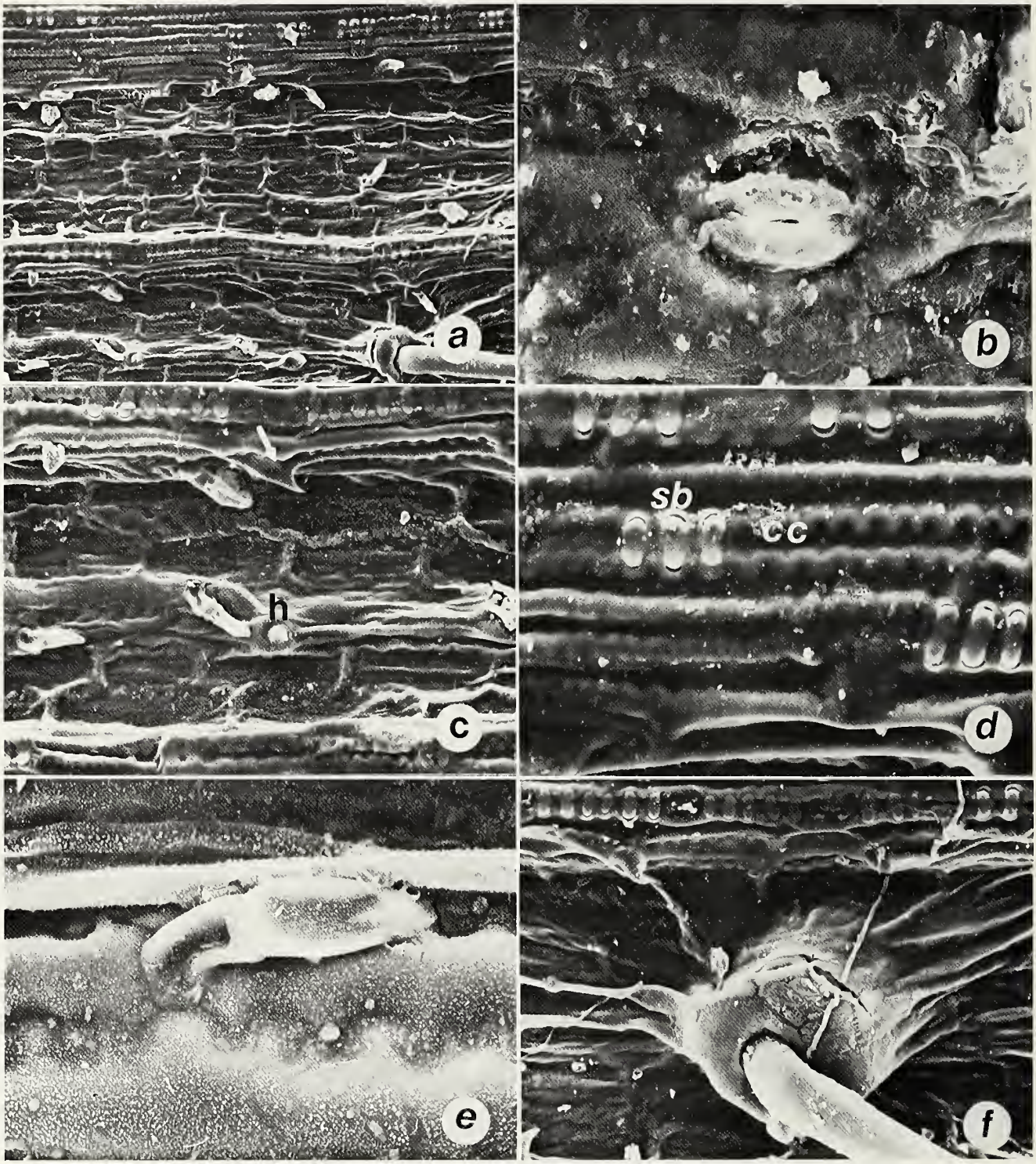

PLATE 29.—Abaxial epidermis *Eulalia villosa,* Davidse 6852: *a,* overview, long cells, ×160; *b,* stomata, ×1250; *c,* long cells, intercostal prickle (arrow), hook (h), ×320; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

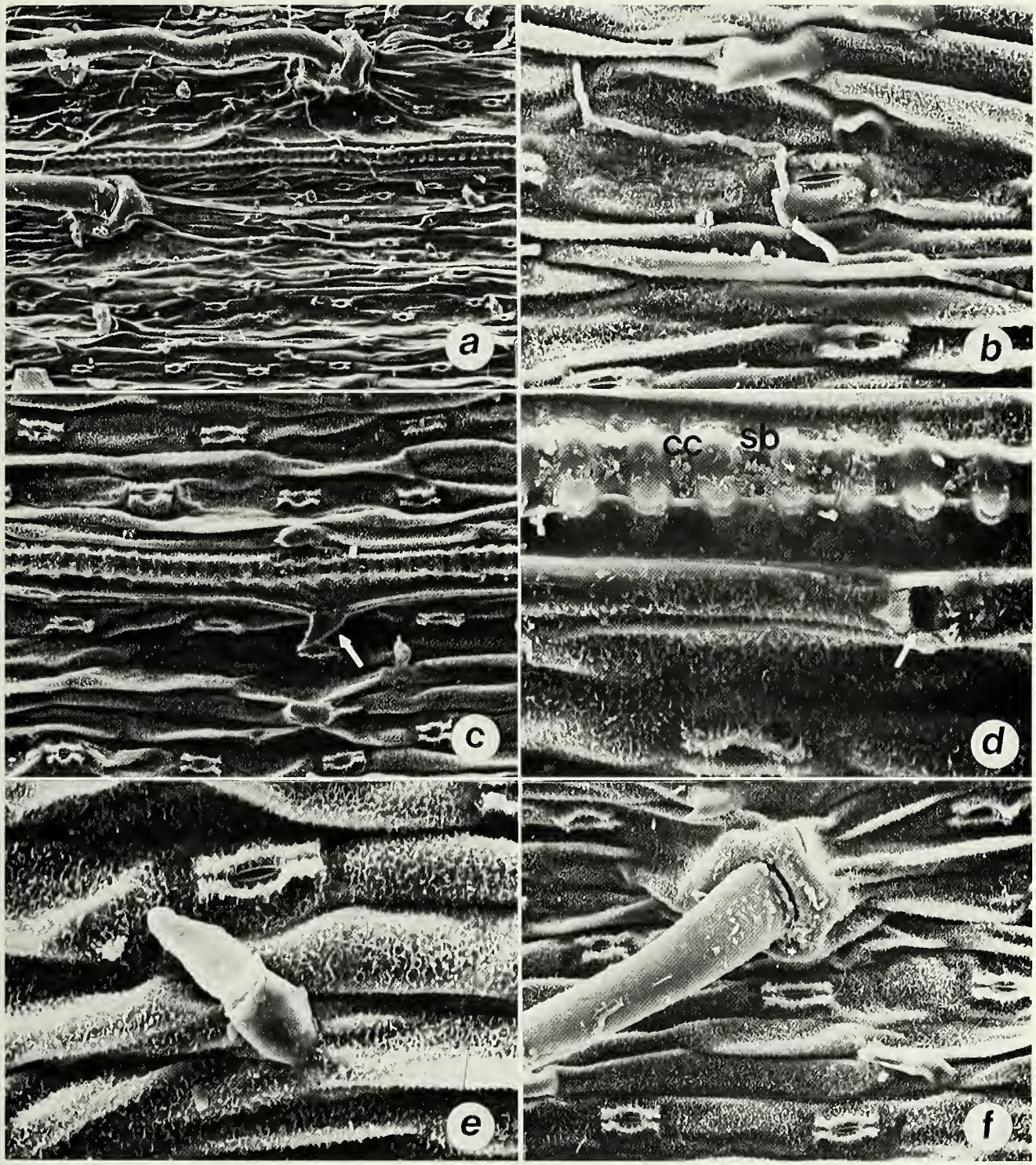

PLATE 30.—Adaxial epidermis *Eulalia villosa,* Davidse 6852: *a,* overview, long cells, ×160; *b,* stomata, prickles, ×640; *c,* interstomatal cells, long cells, prickles (arrow), ×320; *d,* costal silica bodies (sb), cork cells (cc), intercostal cork cell (arrow), ×960; *e,* microhair, ×960; *f,* base of macrohair, ×480.

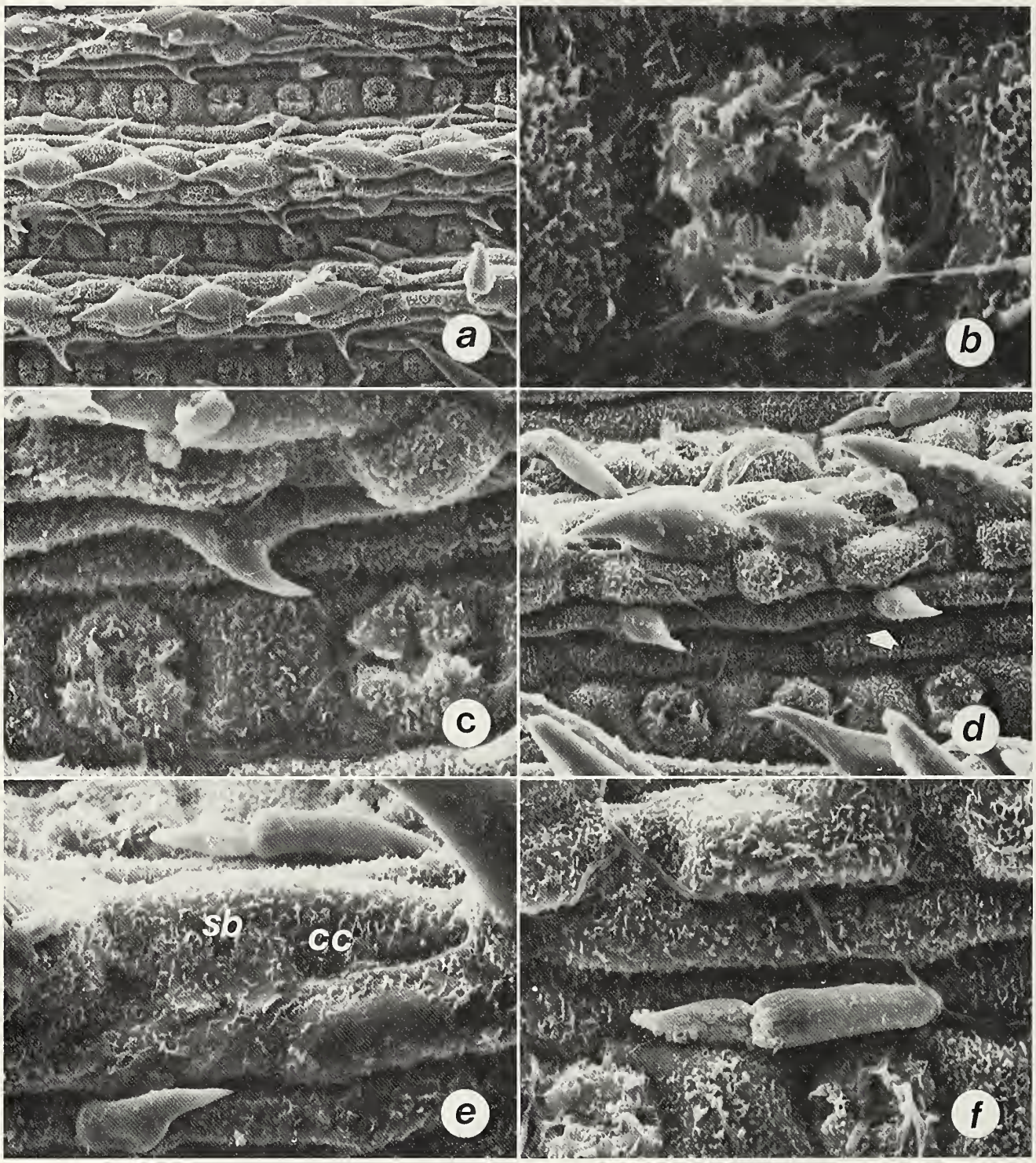

PLATE 31.—Abaxial epidermis *Exotheca abyssinica,* Brass 17344: *a,* overview, ×320; *b,* stoma, ×2500; *c,* interstomatal cell, ×1250; *d,* long cells, costal prickles, intercostal hooks (arrow), ×640; *e,* costal silica body (sb), cork cell (cc), ×1250; *f,* microhair, ×1250.

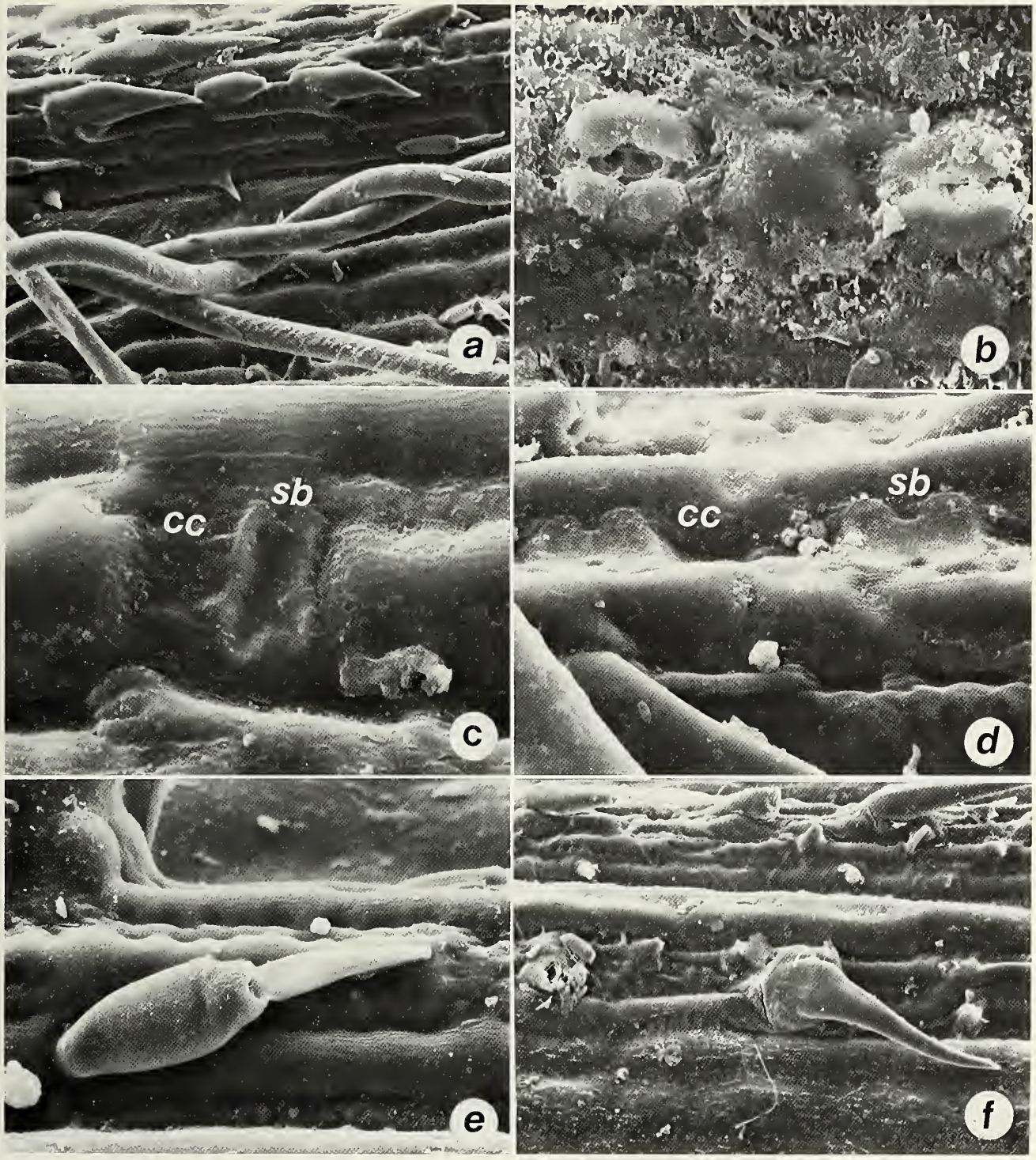

PLATE 32.—Adaxial epidermis *Exotheca abyssinica,* Brass 17344: *a,* overview, long cells, intertwined macrohairs, prickles, ×320; *b,* stomata, interstomatal cell, ×1250; *c,* intercostal silica body (sb), cork cell (cc), ×2500; *d,* costal silica body (sb), cork cell (cc), ×1250; *e,* microhair, ×1250; *f,* costal short macrohair-type prickles, ×320.

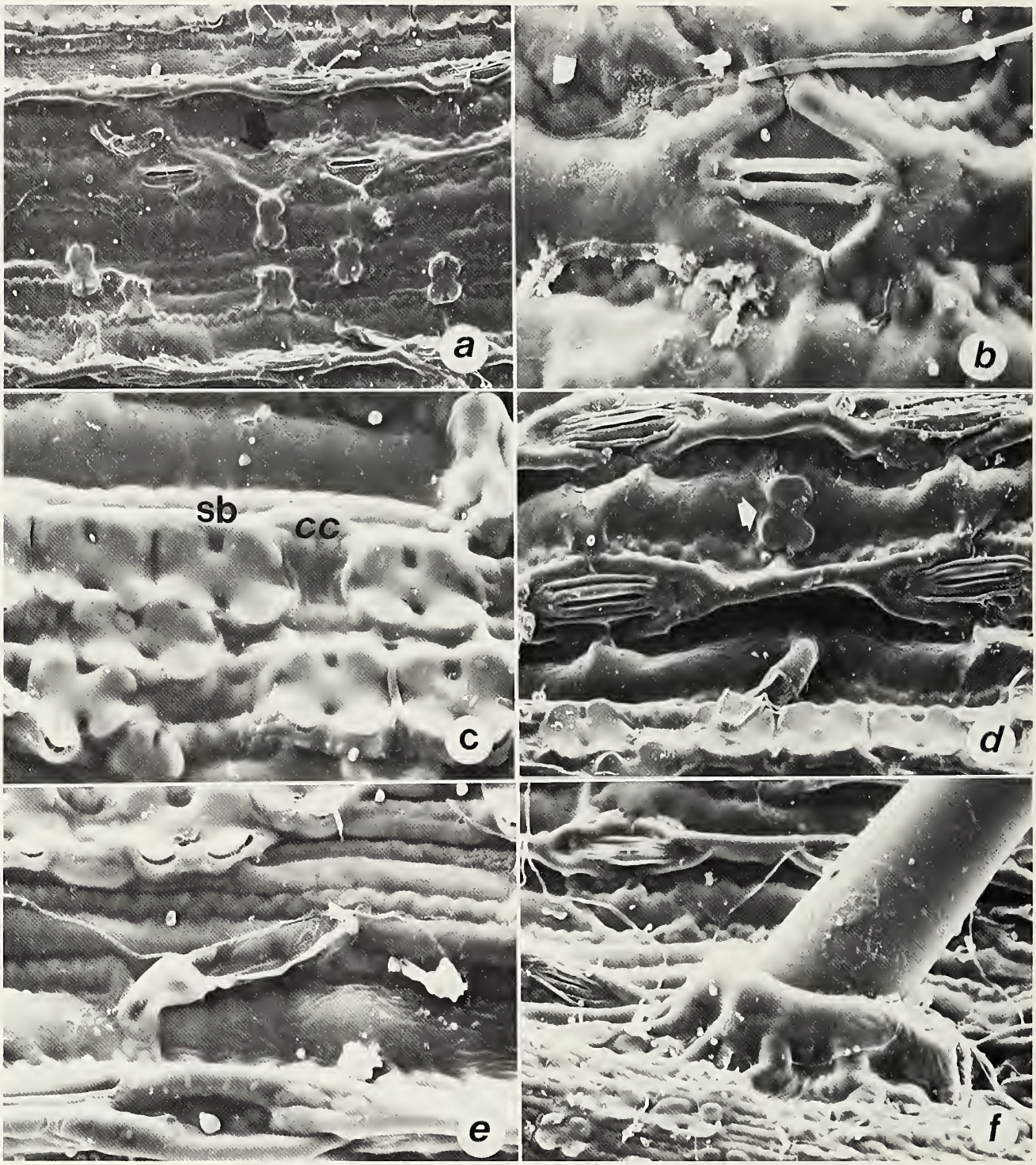

PLATE 33.—Abaxial epidermis *Hackelochloa granularis*, Wood 245: *a*, overview, interstomatal cells (arrow), ×320; *b*, stoma, ×960; *c*, costal silica bodies (sb), cork cells (cc), ×960; *d*, intercostal silica body (arrow), ×640; *e*, microhair, long cells, ×960; *f*, base of macrohair, ×480.

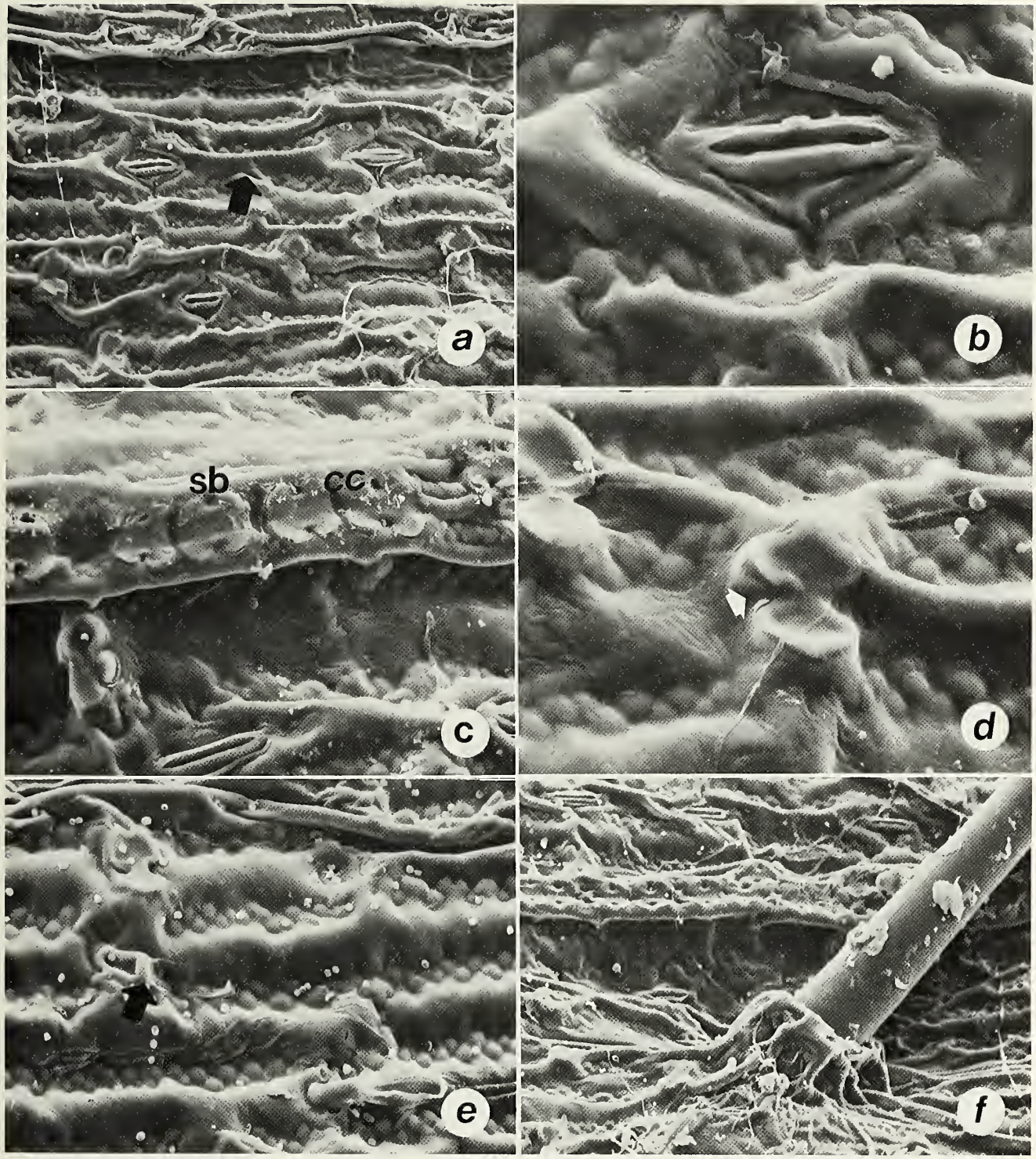

PLATE 34.—Adaxial epidermis *Hackelochloa granularis*, Wood 245: *a*, overview, interstomatal cells (arrow), ×320; *b*, stoma, ×1250; *c*, costal silica bodies (sb), cork cells (cc), ×640; *d*, intercostal silica bodies (arrow), ×1250; *e*, long cells, microhairs (arrow), ×640; *f*, base of macrohair, ×320.

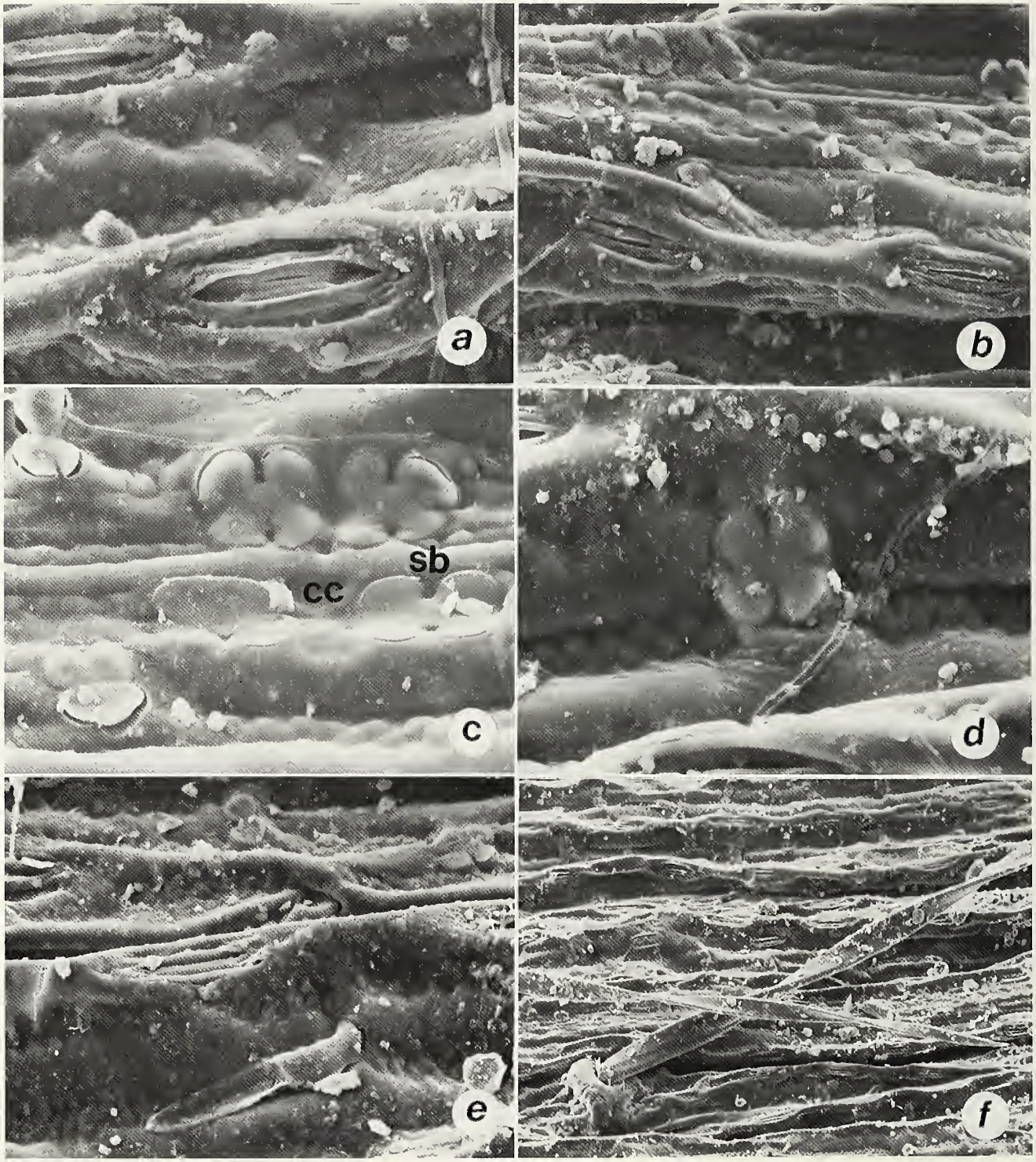

PLATE 35.—Abaxial epidermis *Hemarthria natans*, Archer 716: *a*, stoma, ×1250; *b*, interstomatal cell, long cells, ×640; *c*, costal silica bodies (sb), cork cells (cc), ×1250; *d*, intercostal silica body, ×1250; *e*, microhair, ×640; *f*, macrohairs with twisted shafts, ×160.

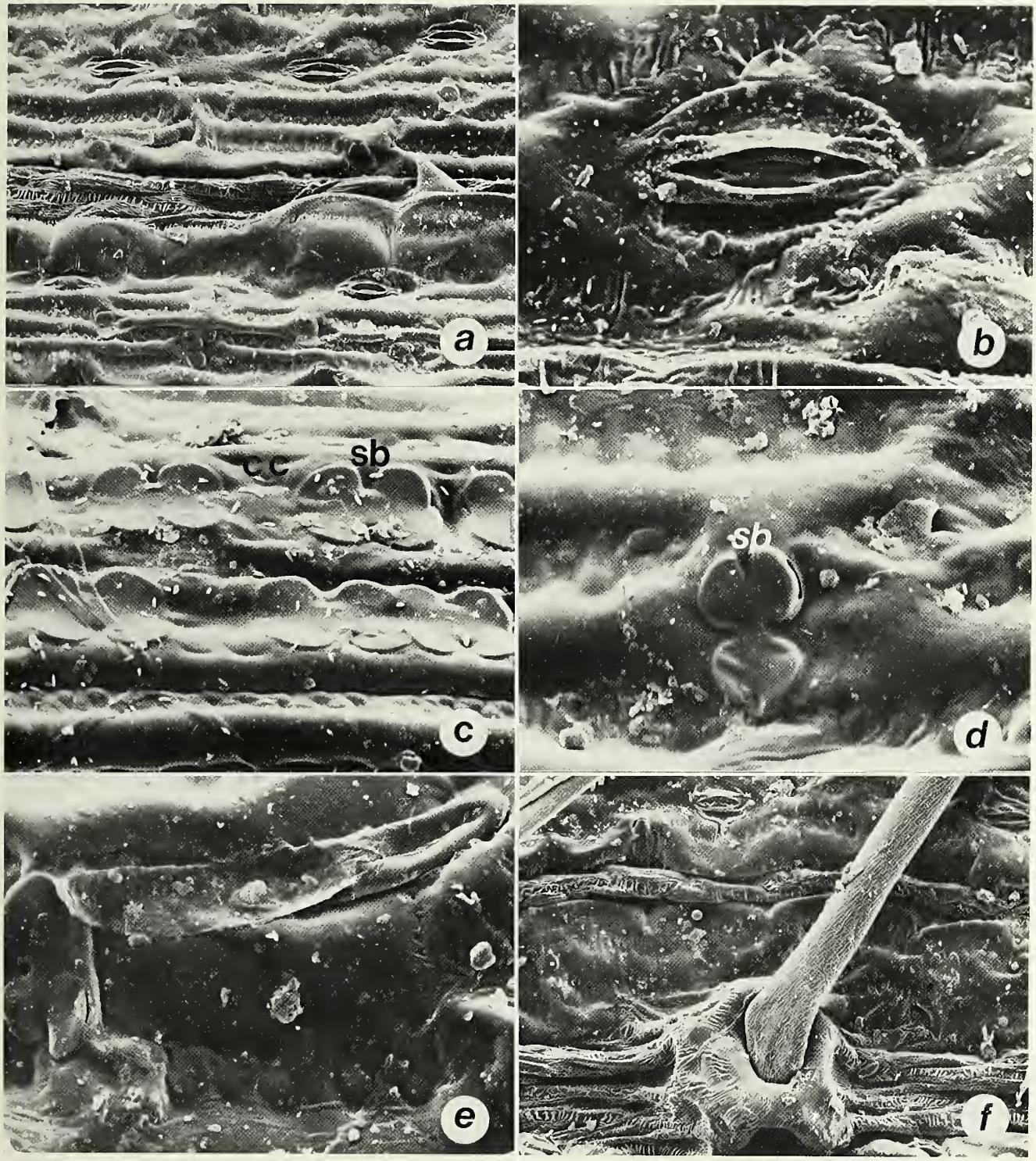

PLATE 36.—Adaxial epidermis *Hemarthria natans*, Archer 716: *a*, overview, ×320; *b*, stoma, ×1250; *c*, costal silica bodies (sb), cork cells (cc), ×1250; *d*, intercostal silica body (sb), ×1250; *e*, microhair, ×1250; *f*, base of macrohair, ×320.

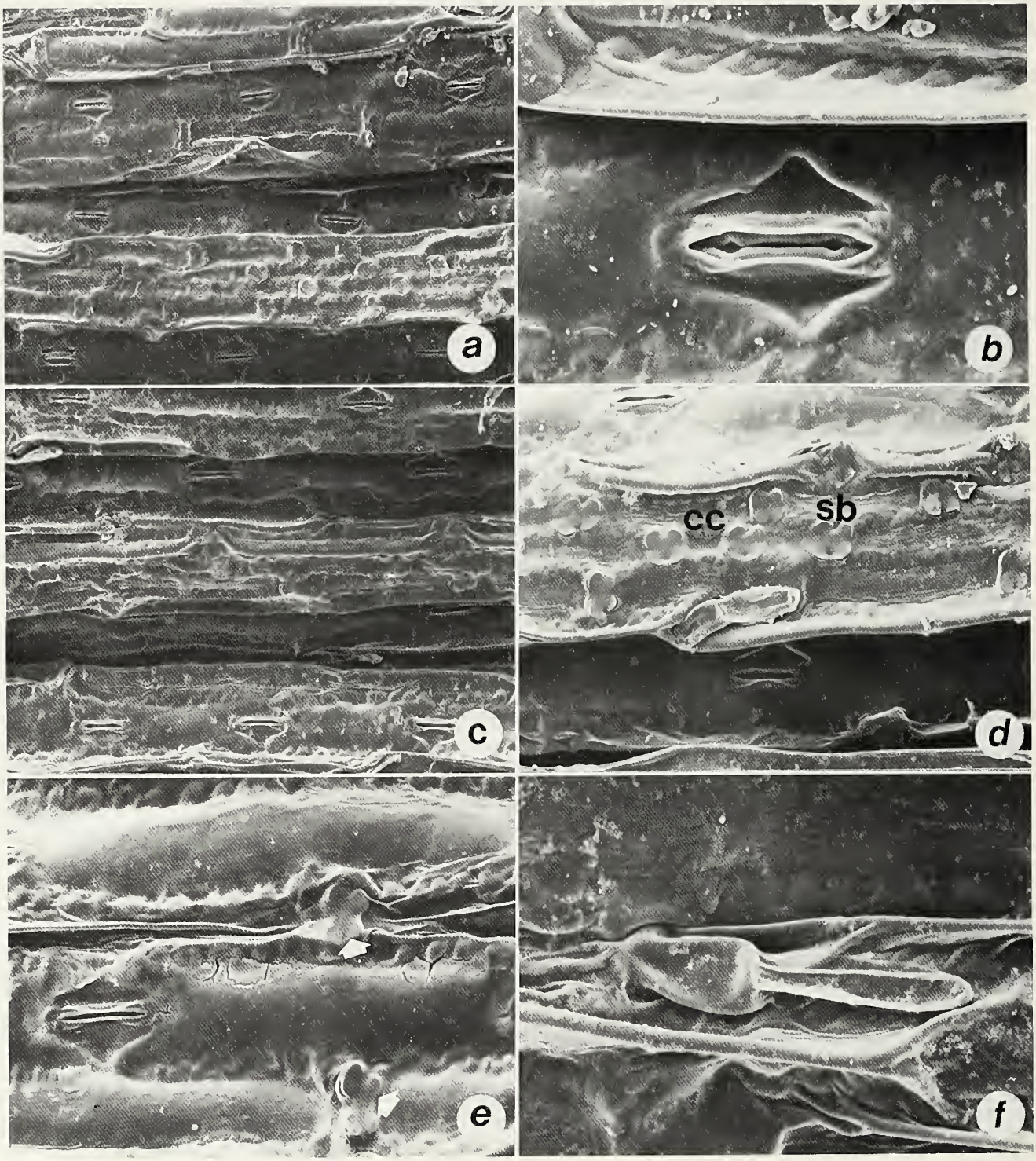

PLATE 37.—Abaxial epidermis *Heteropholis sulcata,* Milne-Redhead and Taylor 9058: *a,* overview, ×240; *b,* stoma, ×1250; *c,* interstomatal cells, long cells, ×320; *d,* costal cork cells (cc), silica bodies (sb), ×480; *e,* intercostal silica bodies (arrows), ×640; *f,* microhair, ×1250.

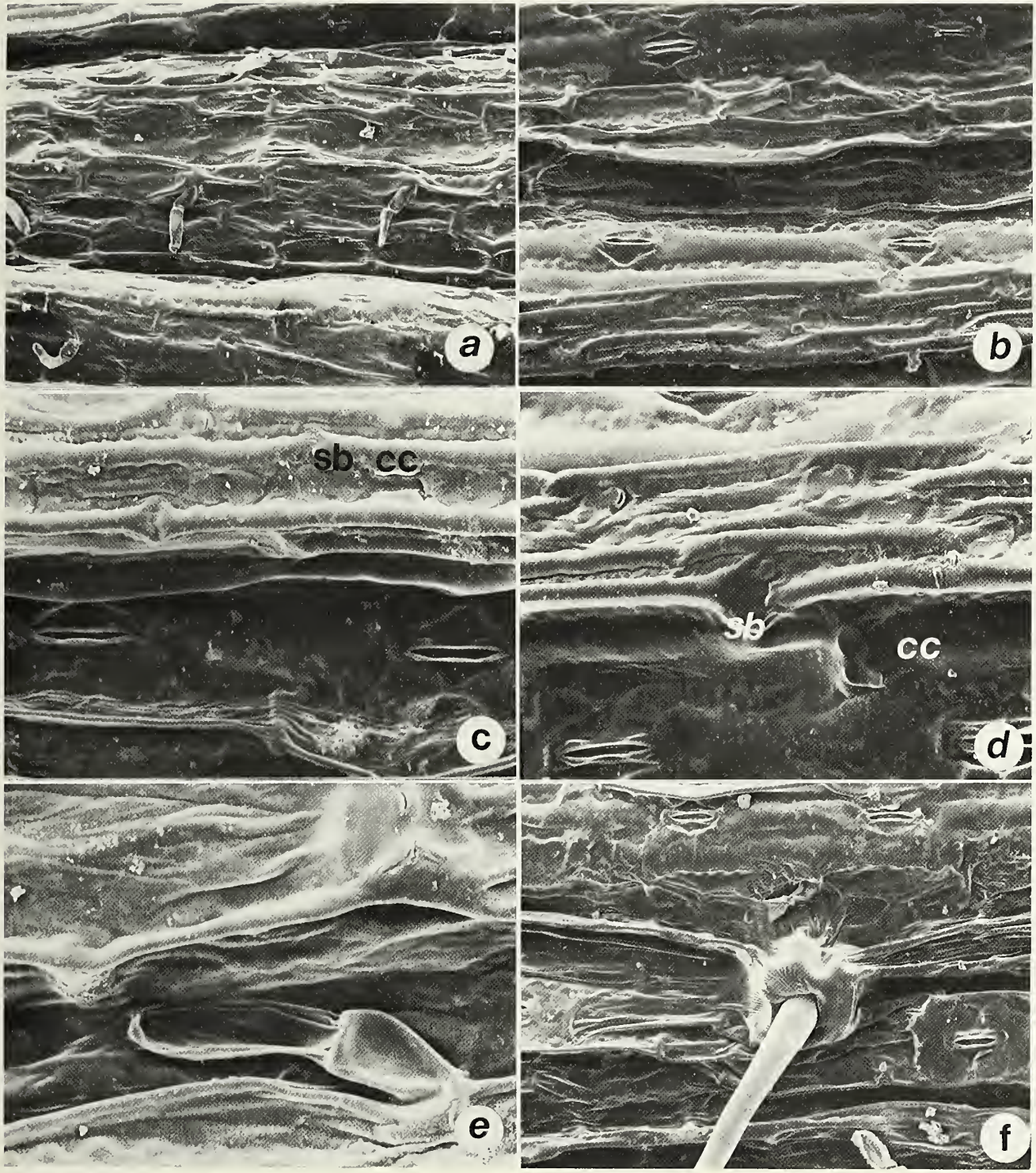

PLATE 38.—Adaxial epidermis *Heteropholis sulcata,* Milne-Redhead and Taylor 9058: *a,* overview, ×240; *b,* stomata, interstomatal cells, ×320; *c,* costal silica bodies (sb), cork cells (cc), interstomatal cell, ×640; *d,* intercostal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

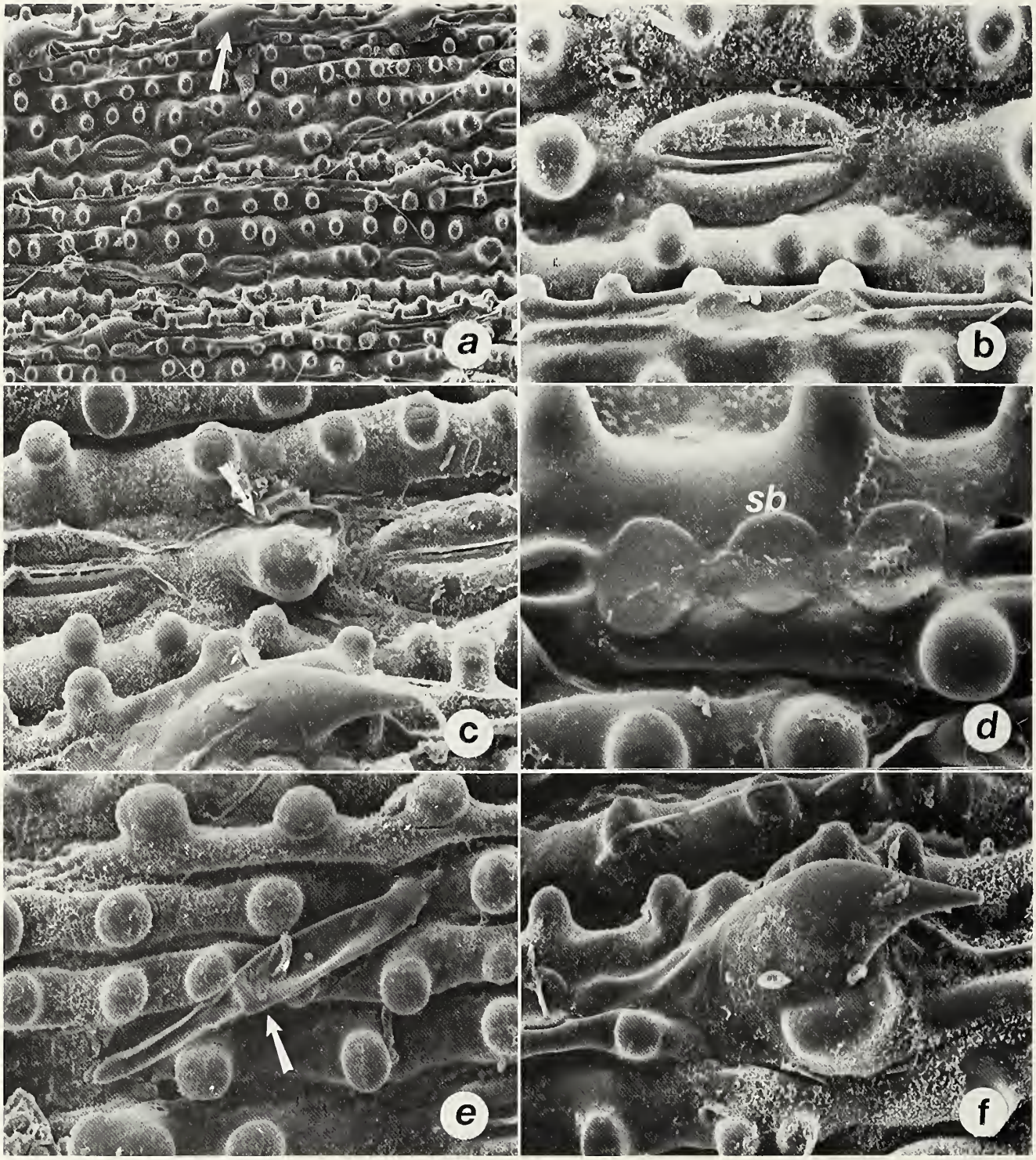

PLATE 39.—Abaxial epidermis *Heteropogon melanocarpus,* Mbano and Ndolanga 104: *a,* overview, prickles (arrow), long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), prickle, stomata, ×1250; *d,* costal silica body (sb), ×2500; *e,* microhair (arrow), long cells, ×1250; *f,* prickle, ×1250.

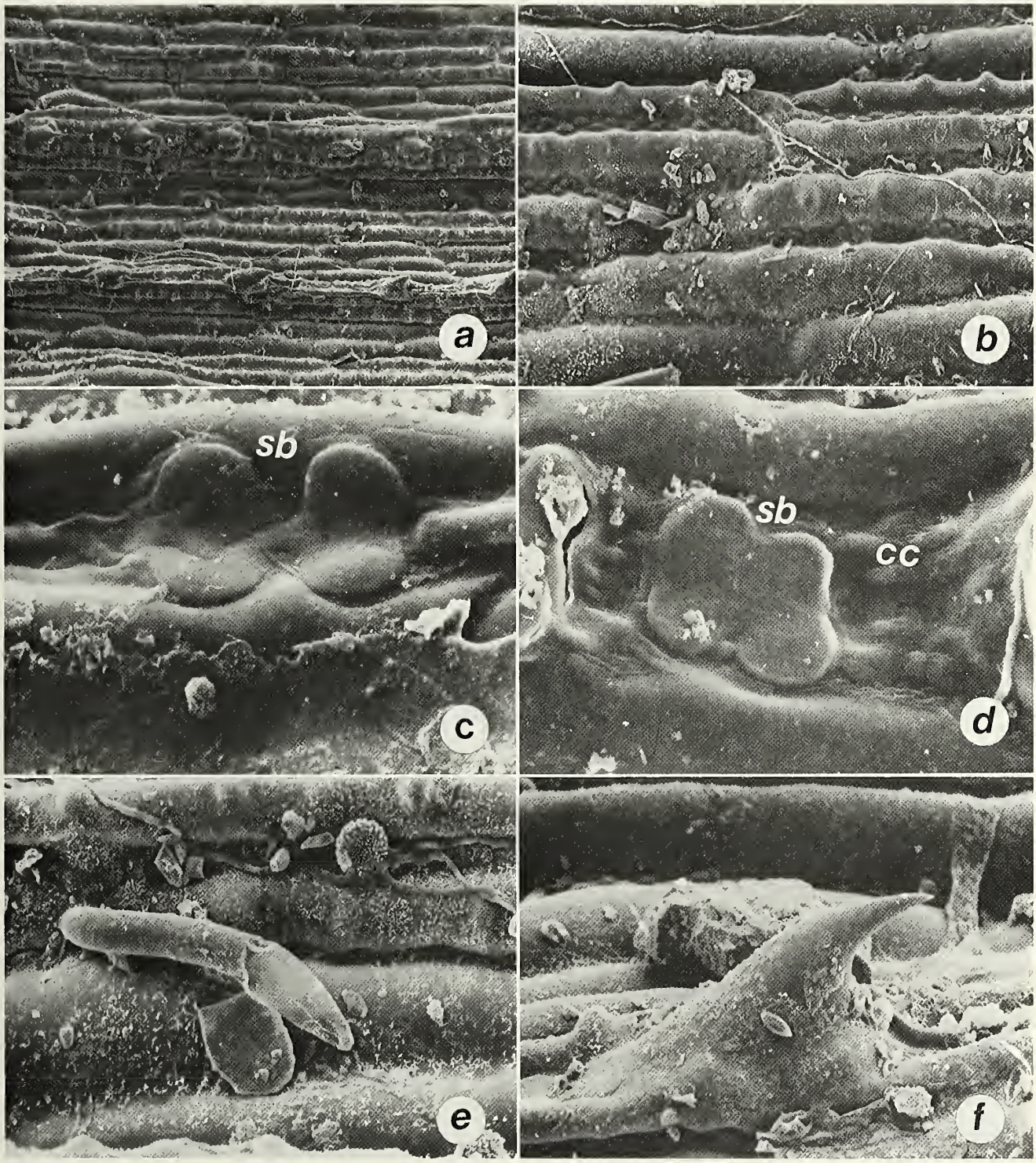

PLATE 40.—Adaxial epidermis *Heteropogon melanocarpus*, Mbano and Ndolanga 104: *a*, overview, prickles, long cells, ×160; *b*, long cells, ×640; *c*, costal silica body (sb), ×2500; *d*, costal silica body (sb), cork cells (cc), ×2500; *e*, microhair, ×1250; *f*, prickle, ×1250.

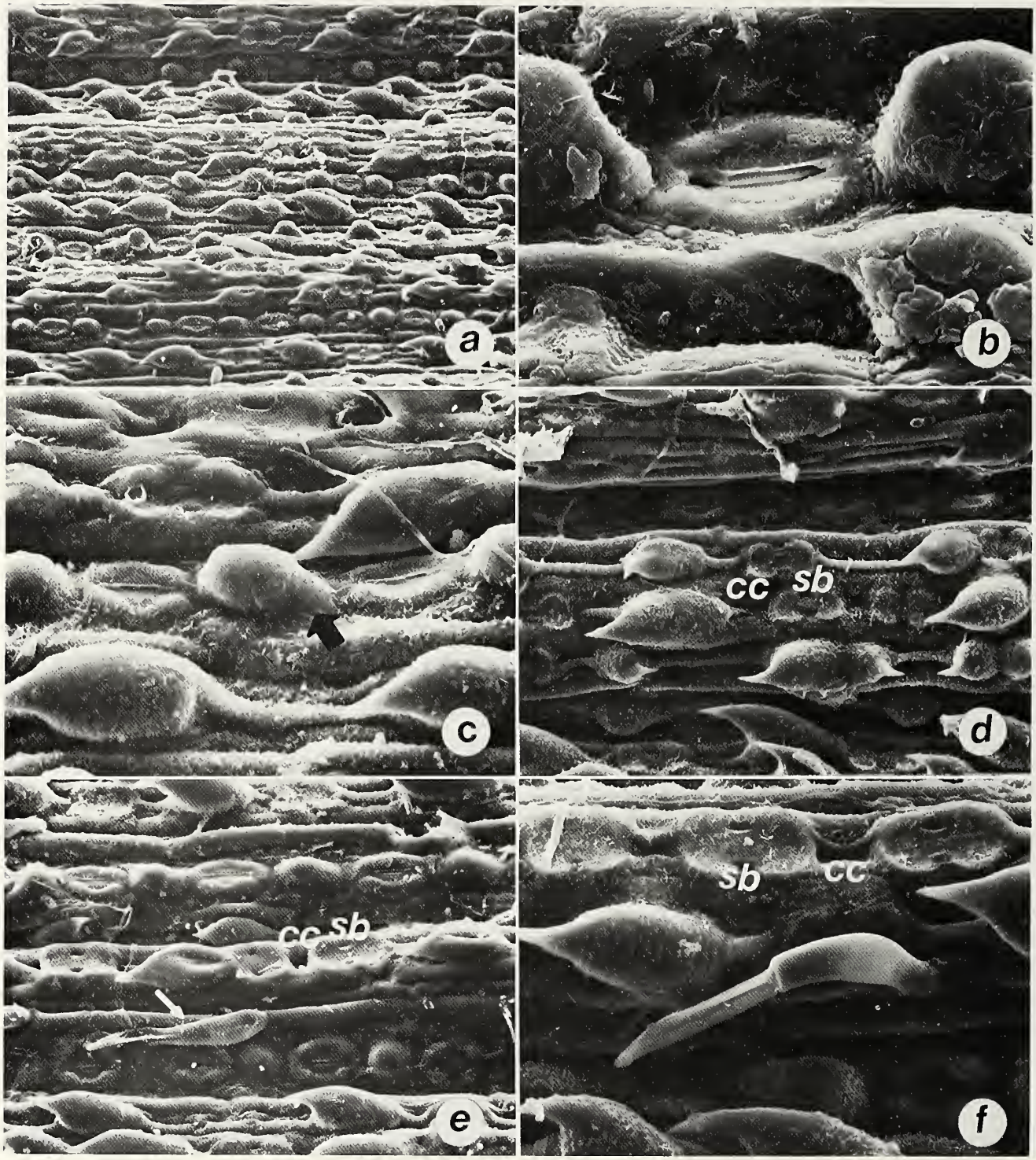

PLATE 41.—Abaxial epidermis *Homozeugos eylesii*, Webster T237: *a*, overview, ×320; *b*, stoma, ×2500; *c*, interstomatal cells (arrow), long cells, ×1250; *d*, prickles, costal silica bodies (sb), cork cells (cc), ×640; *e*, microhair (arrow), costal silica bodies (sb), cork cells (cc), ×640; *f*, costal silica bodies (sb), cork cells (cc), microhair, ×1250.

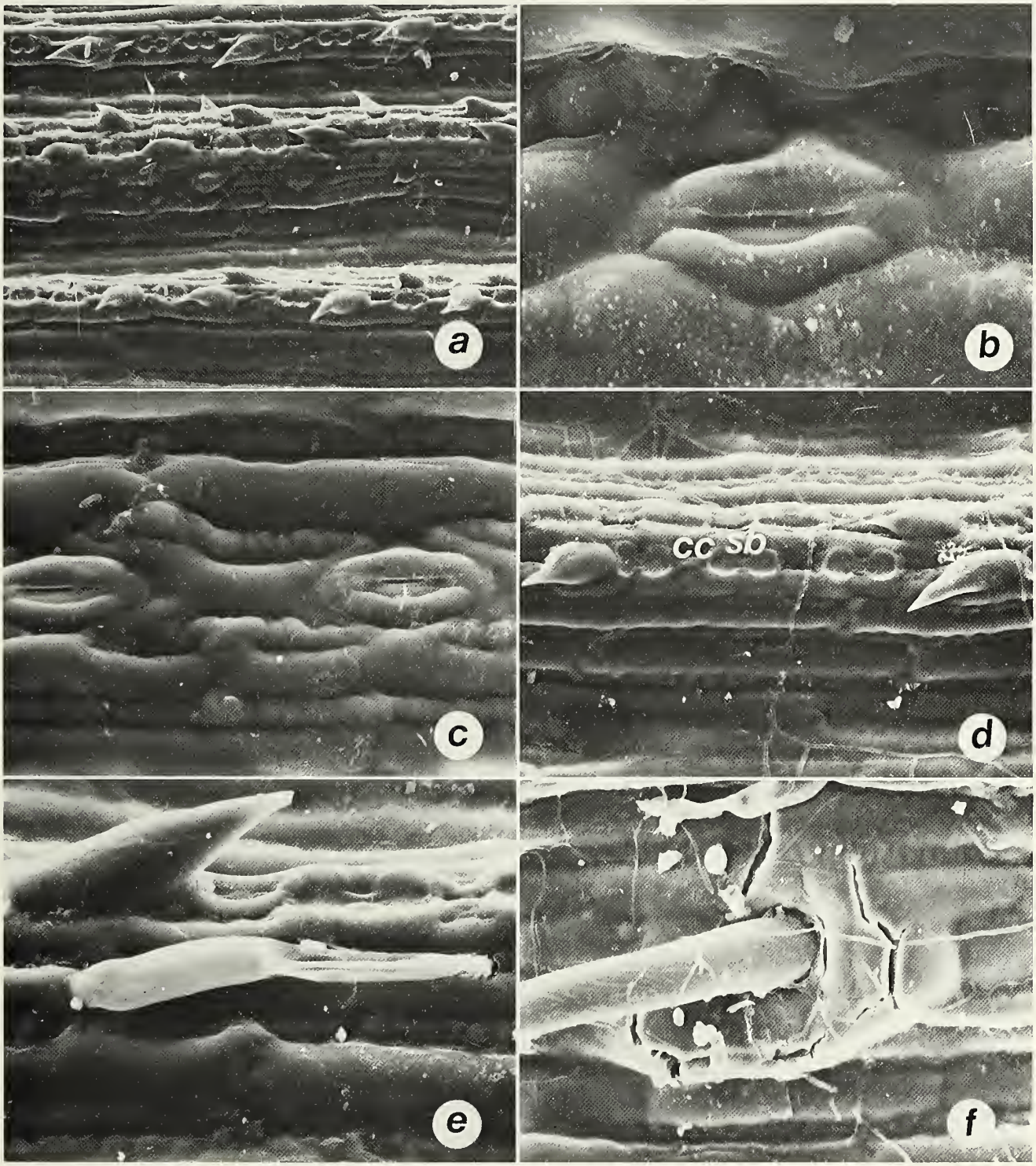

PLATE 42.—Adaxial epidermis *Homozeugos eylesii,* Webster T237: *a,* overview, prickles, ×320; *b,* stoma, ×2500; *c,* interstomatal cell, long cells, ×1250; *d,* costal silica bodies (sb), cork cells (cc), long cells, ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×640.

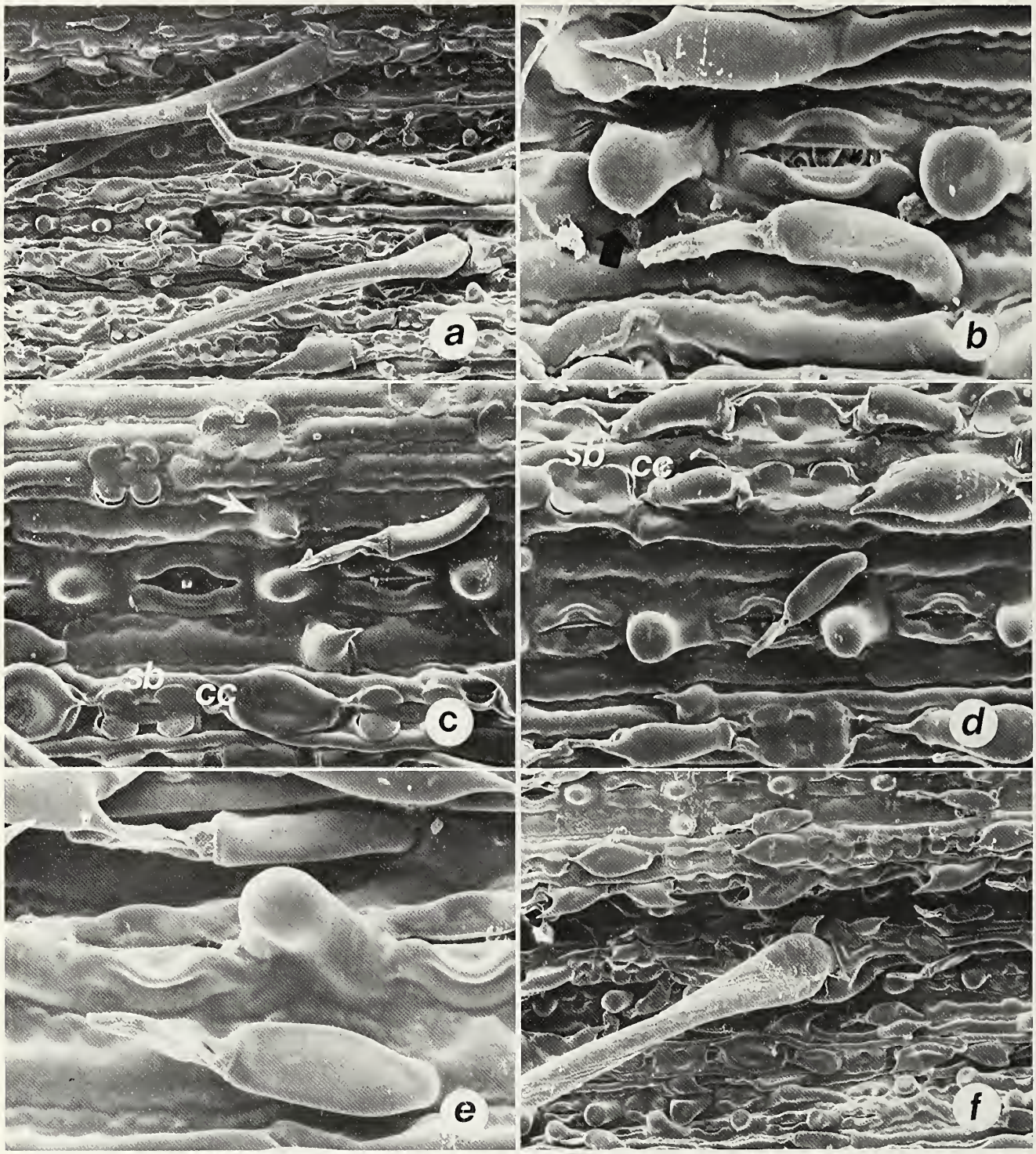

PLATE 43.—Abaxial epidermis *Hyparrhenia bracteata,* Webster A247: *a,* overview, prickles (arrow), ×240; *b,* stoma, interstomatal cells (arrow), ×1250; *c,* long cells, hooks (arrow), costal silica bodies (sb), cork cells (cc), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhairs, ×1250; *f,* base of macrohair, ×320.

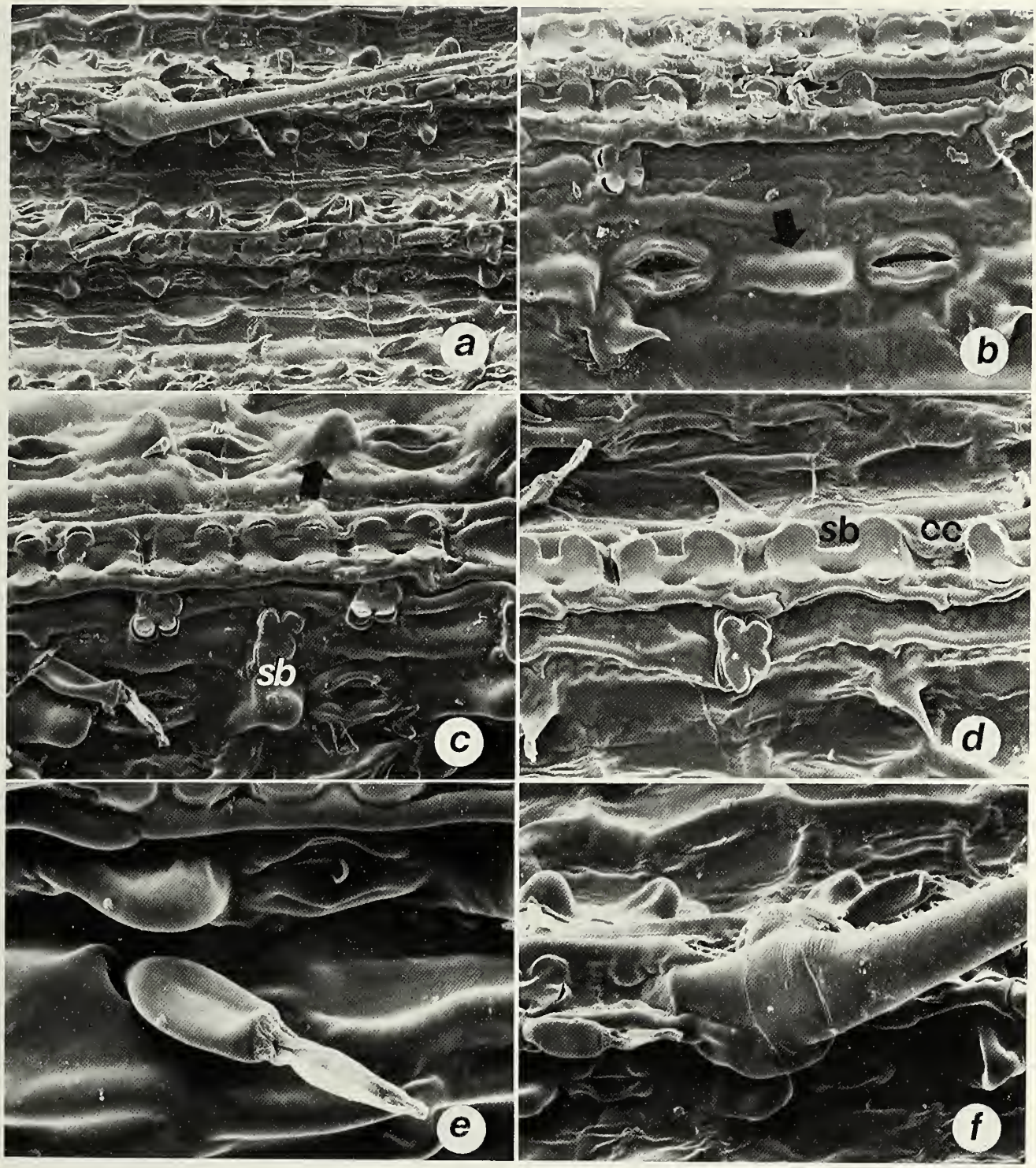

PLATE 44.—Adaxial epidermis *Hyparrhenia bracteata,* Webster A247: *a,* overview, long cells, ×160; *b,* stomata, interstomatal cell (arrow), ×640; *c,* intercostal silica bodies (sb), interstomatal cells (arrow), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×640.

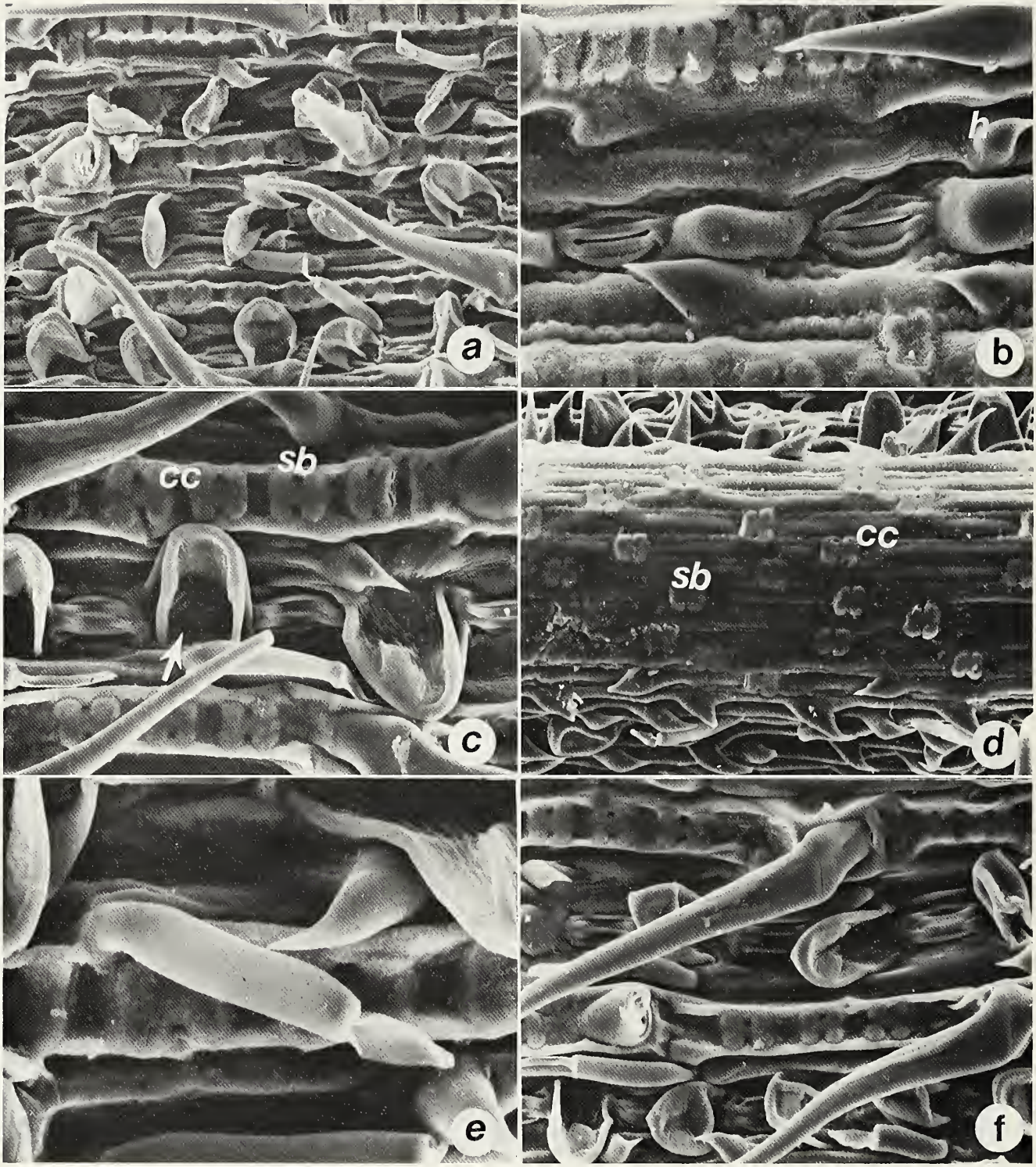

PLATE 45.—Abaxial epidermis *Hyperthelia dissoluta,* Davidse 9212: *a,* overview, long cells, ×352; *b,* stomata, interstomatal cells, intercostal hooks (h), ×704; *c,* interstomatal cells (arrow), costal silica bodies (sb), cork cells (cc), ×704; *d,* silica bodies (sb) and cork cells (cc) on midvein, ×352; *e,* microhair, ×1375; *f,* macrohairs, ×528.

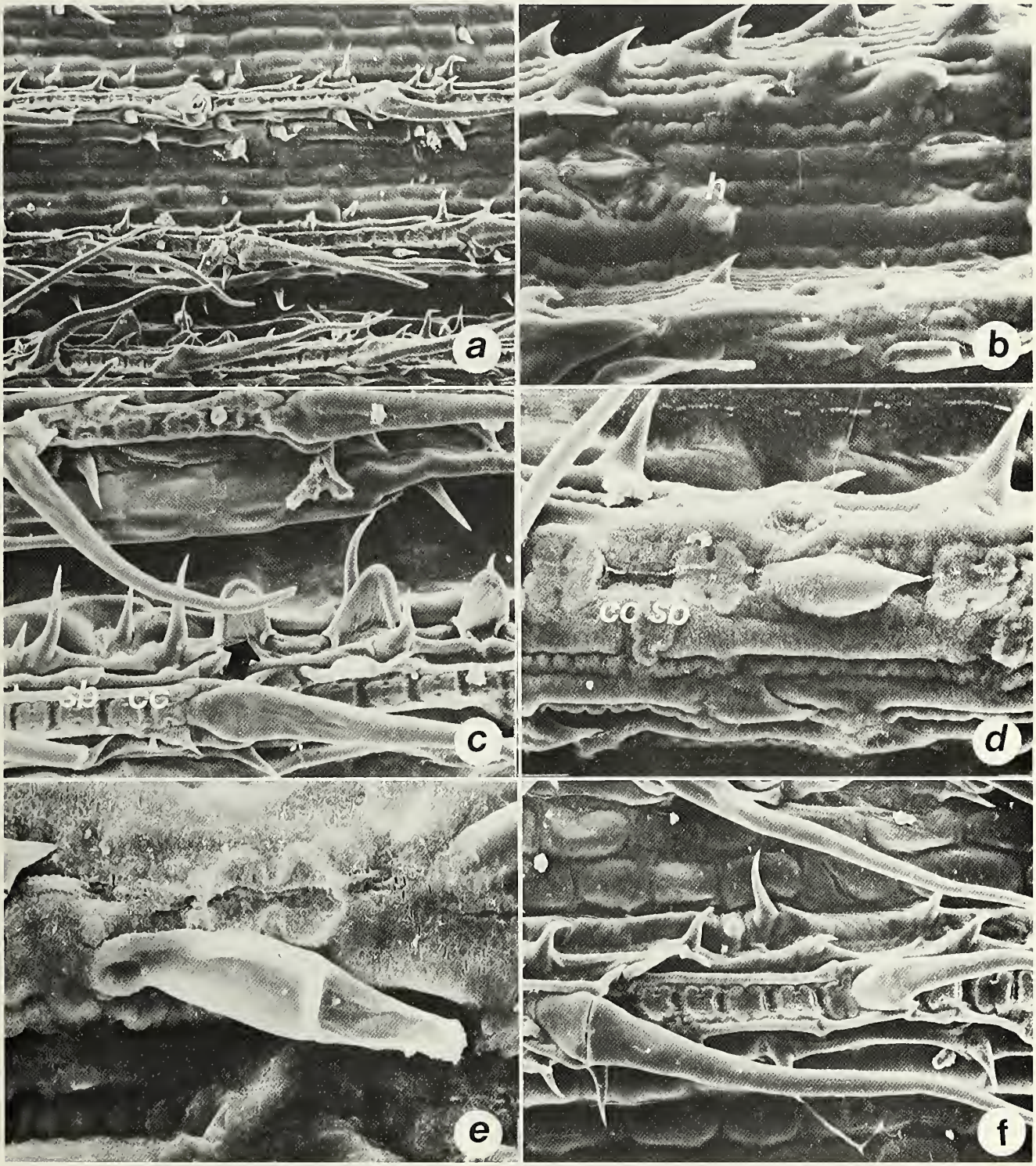

PLATE 46.—Adaxial epidermis *Hyperthelia dissoluta,* Davidse 9212: *a,* overview, long cells, ×352; *b,* stomata, interstomatal cell, hook (h), ×528; *c,* papillate interstomatal cells (arrow), intercostal short macrohair-type prickles, costal silica bodies (sb), cork cells (cc), ×352; *d,* intercostal silica body (sb), cork cell (cc), ×704; *e,* microhair, ×1375; *f,* costal macrohairs, ×352.

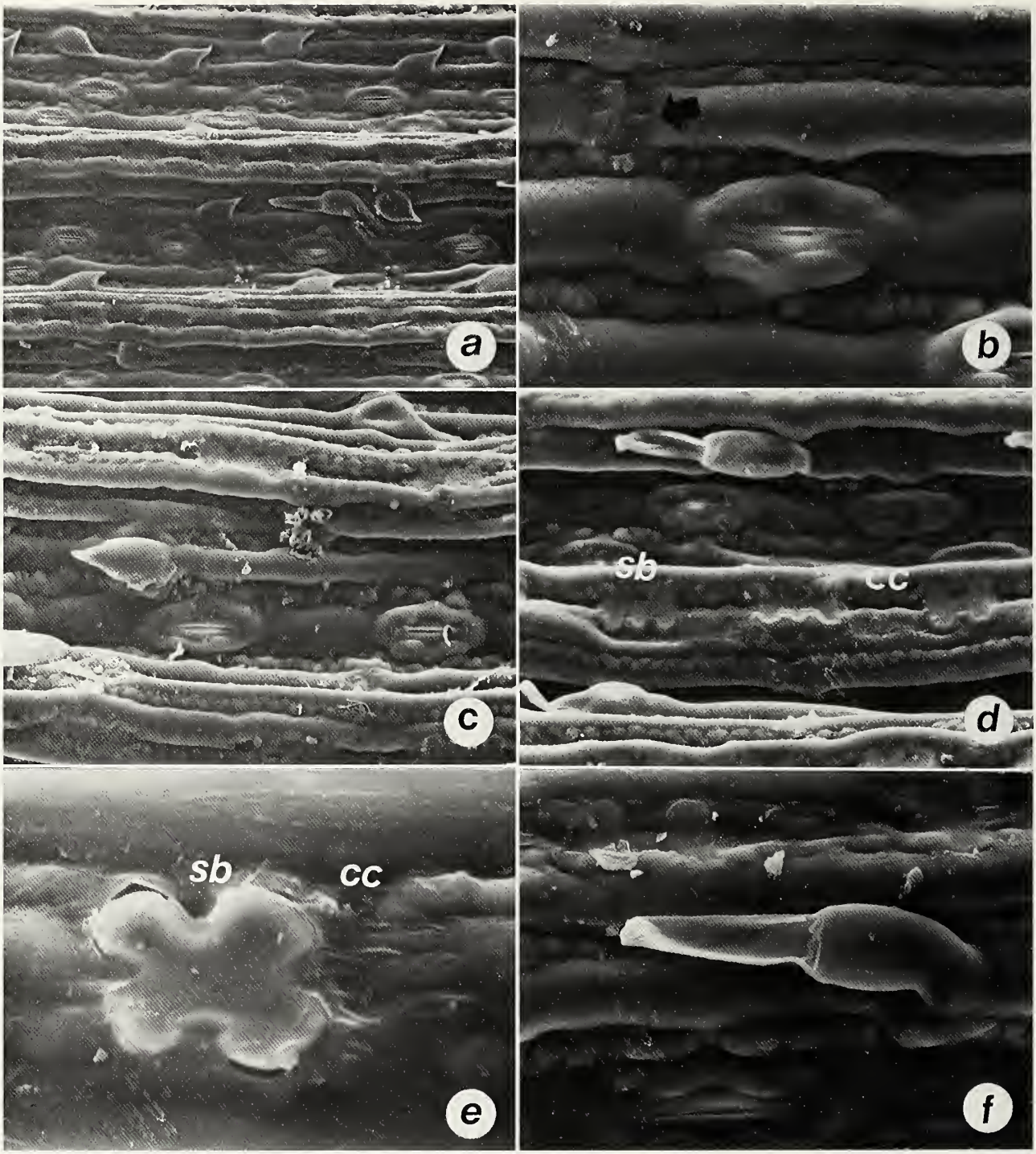

PLATE 47.—Abaxial epidermis *Imperata cylindrica*, Richards 26175: *a*, overview, ×320; *b*, stoma, intercostal cork cell (arrow), ×1250; *c*, interstomatal cells, long cells, prickle, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal cork cell (cc), silica body (sb), ×2500; *f*, microhair, ×1250.

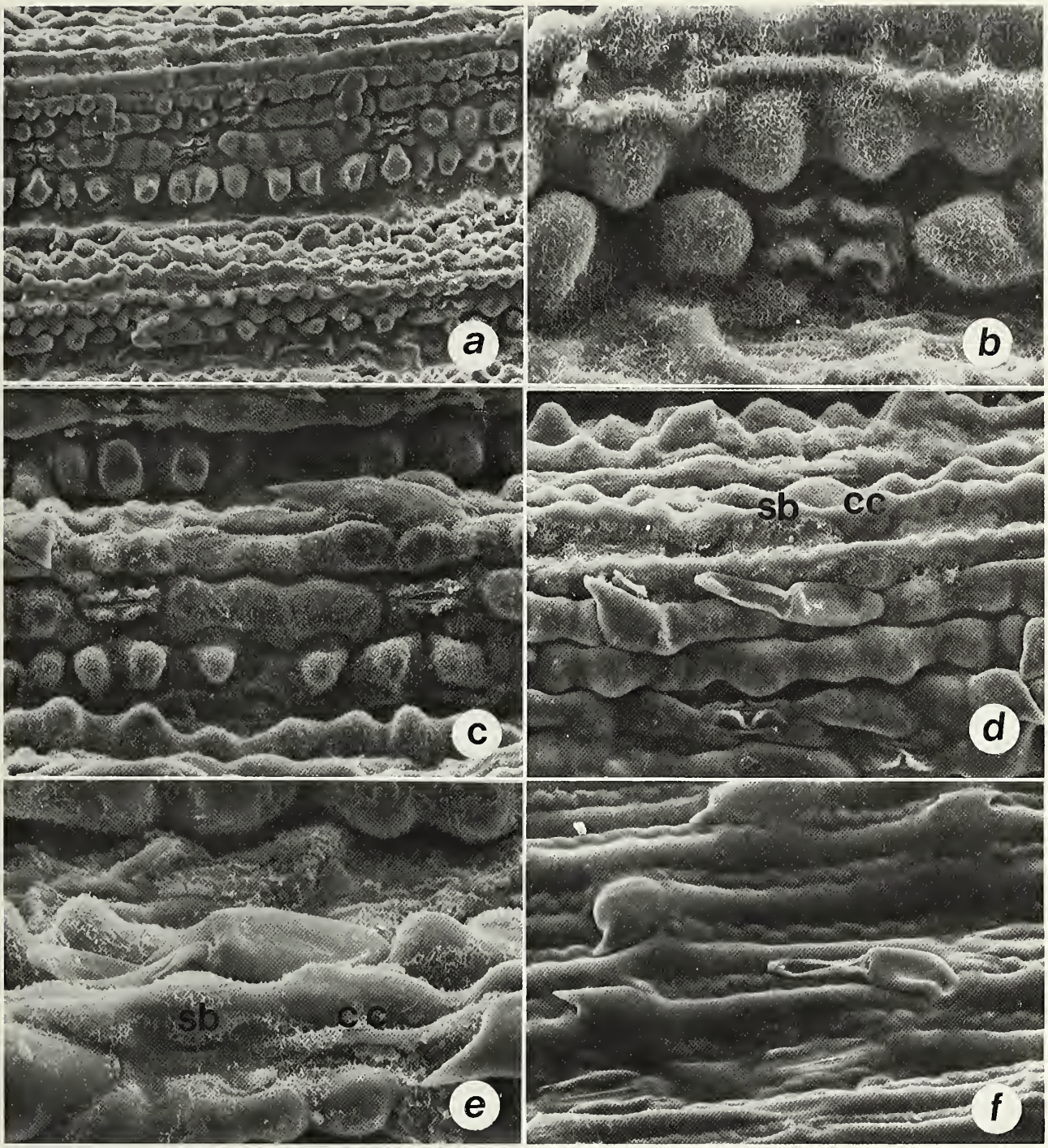

PLATE 48.—Adaxial epidermis *Imperata cylindrica,* Richards 26175: *a,* overview, ×320; *b,* stoma, ×1250; *c,* interstomatal cell, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), long cells, microhair, prickles, ×640; *e,* costal silica body (sb), cork cell (cc), ×1250; *f,* marginal zone with nonpapillate long cells and interstomatal cell, microhair, prickles, ×640.

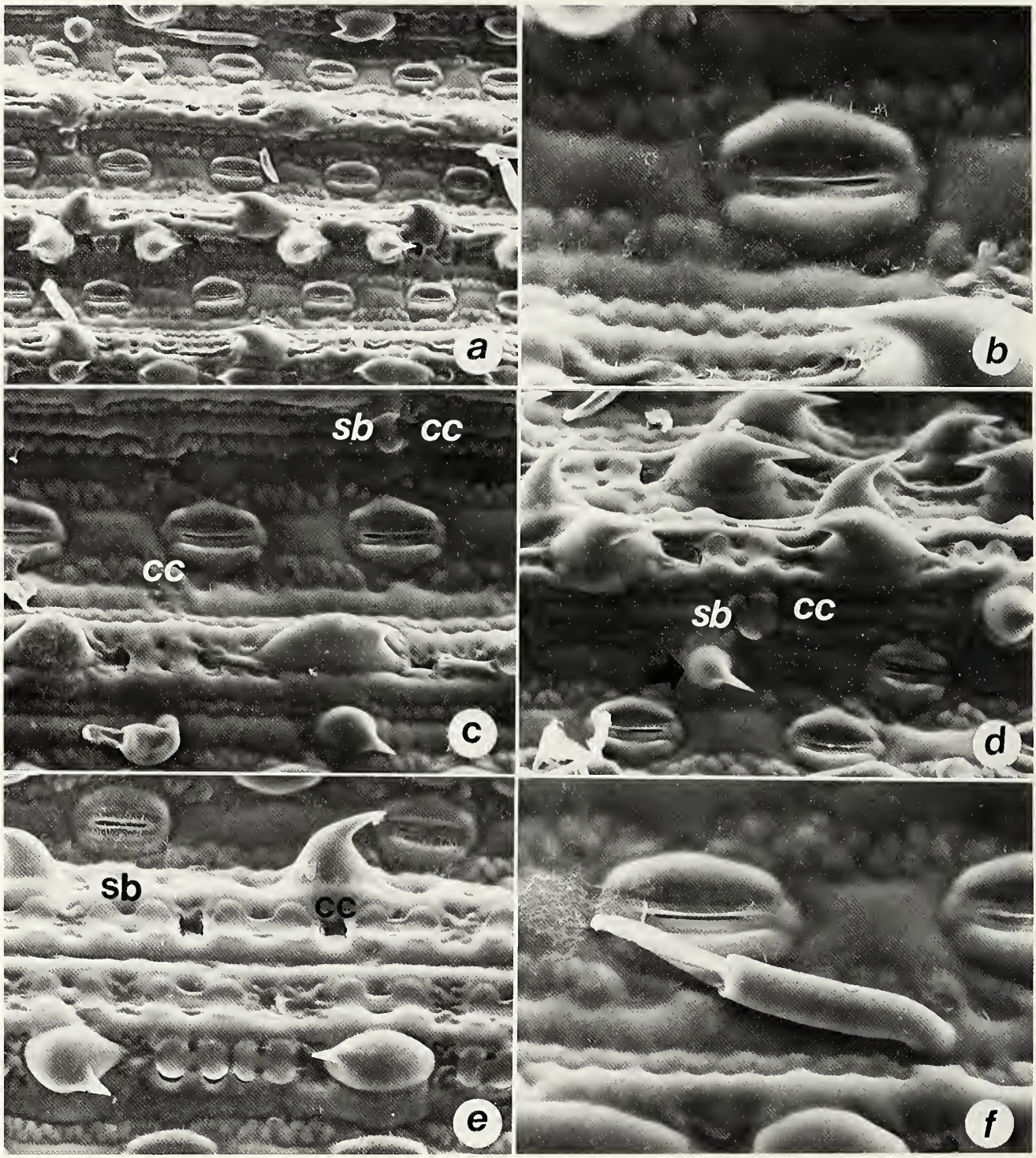

PLATE 49.—Abaxial epidermis *Ischaemum afrum*, Faden 74/746: *a*, overview, ×320; *b*, stoma, ×1250; *c*, interstomatal cells, long cells, intercostal silica body (sb), cork cells (cc), ×640; *d*, prickles, hooks (arrow), intercostal silica body (sb), cork cell (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

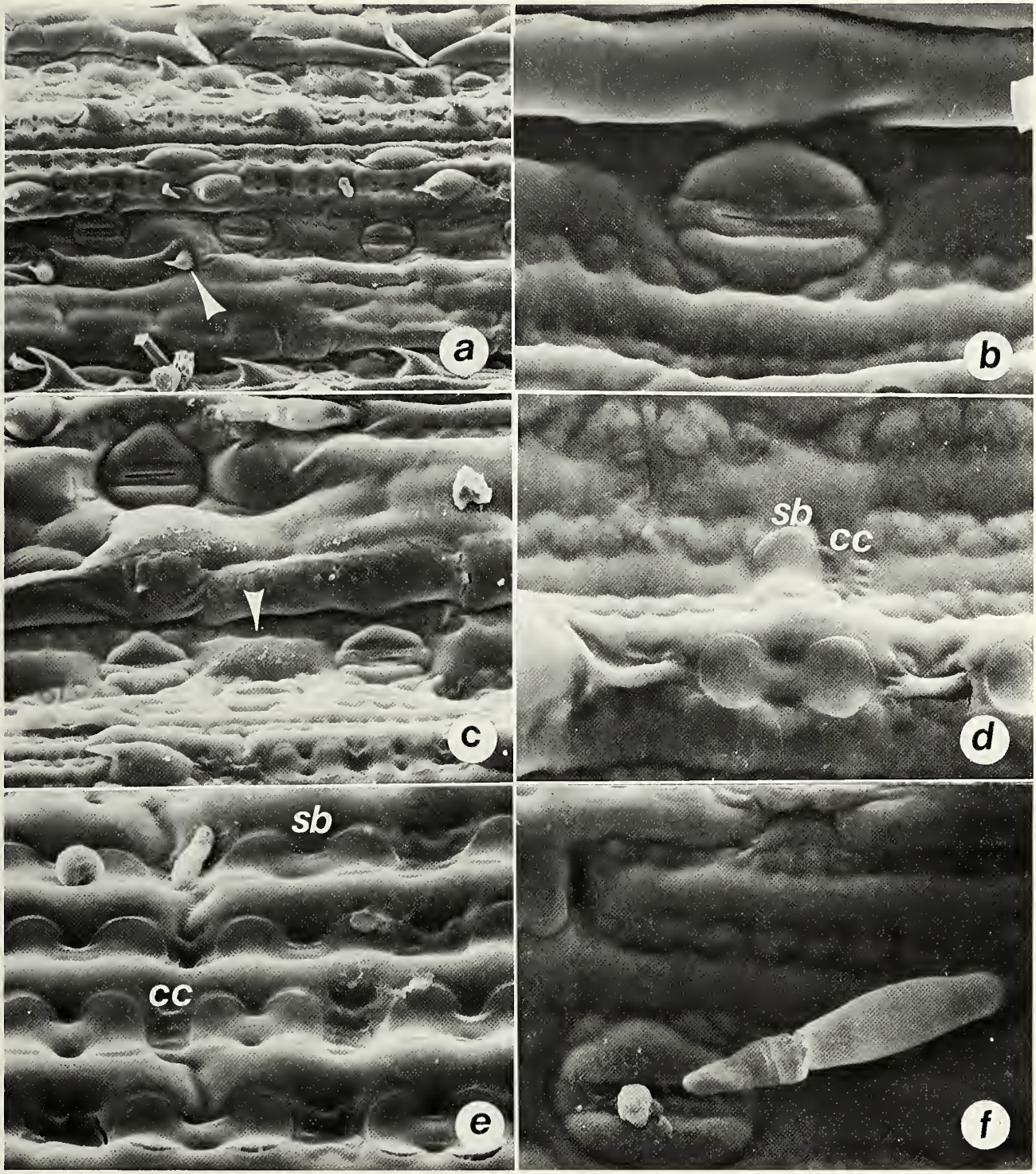

PLATE 50.—Adaxial epidermis *Ischaemum afrum*, Faden 74/746: *a*, overview, prickles, hooks (arrow), ×320; *b*, stoma, ×1250; *c*, interstomatal cell (arrow), ×640; *d*, long cells, intercostal silica body (sb), cork cells (cc), ×1250; *e*, costal silica bodies (sb), cork cells (cc), ×1250; *f*, microhair, ×1250.

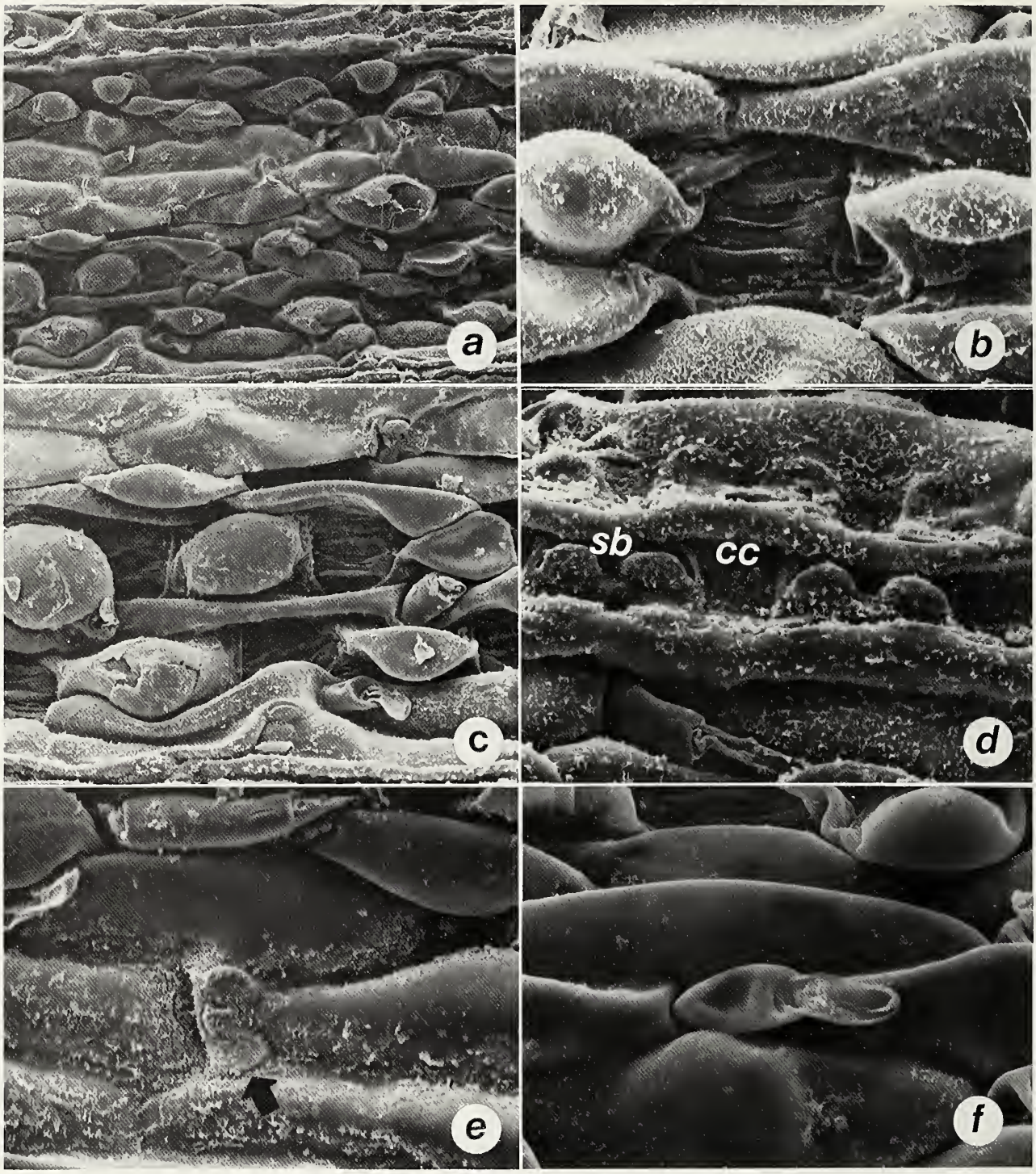

PLATE 51.—Abaxial epidermis *Loxodera caespitosa*, Webster A169: *a*, overview, long cells, ×320; *b*, stoma, ×1250; *c*, interstomatal cells, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, intercostal silica body (arrow), ×1250; *f*, microhair, long cells, ×1250.

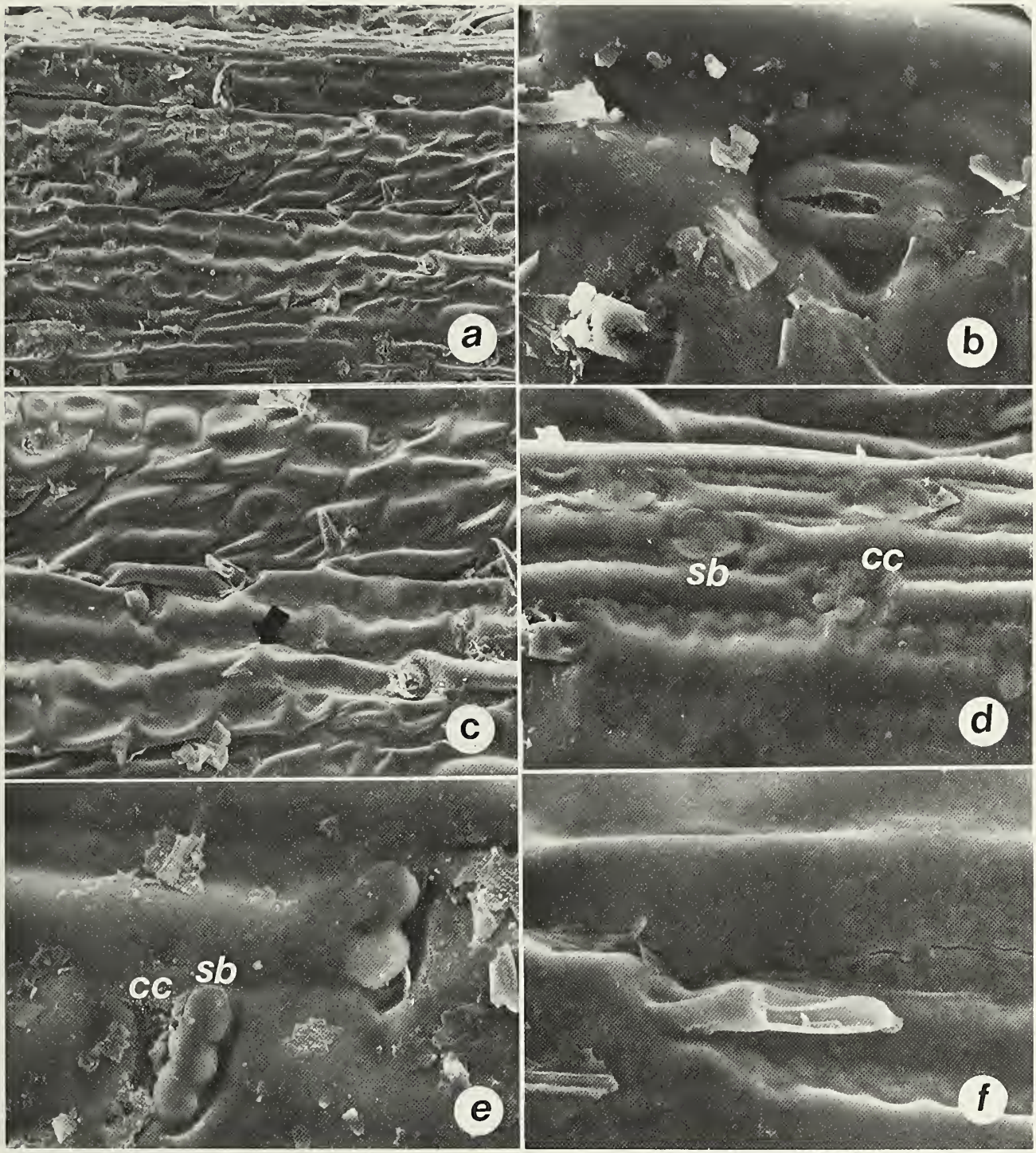

PLATE 52.—Adaxial epidermis *Loxodera caespitosa*, Webster A169: *a*, overview, ×160; *b*, stoma, ×1250; *c*, long cells, prickles (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica body (sb), cork cell (cc), ×1250; *f*, microhair, ×1250.

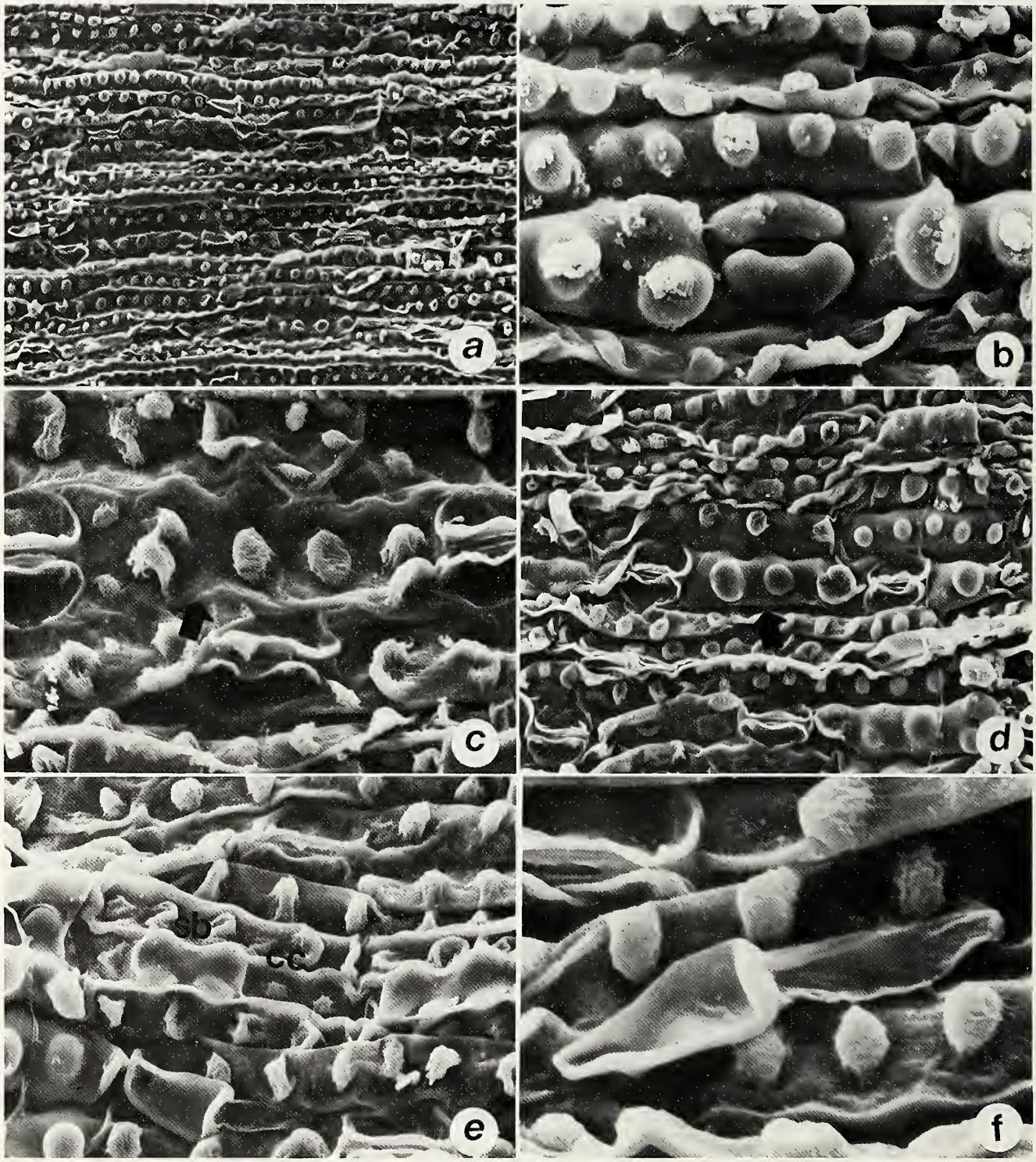

PLATE 53.—Abaxial epidermis *Microstegium nudum*, Thomas 2263: *a*, overview, long cells, ×320; *b*, stoma, ×1250; *c*, interstomatal cell (arrow), ×1250; *d*, interstomatal cell (arrow), long cells, ×640; *e*, costal silica bodies (sb), cork cells (cc), ×1250; *f*, microhair, ×2500.

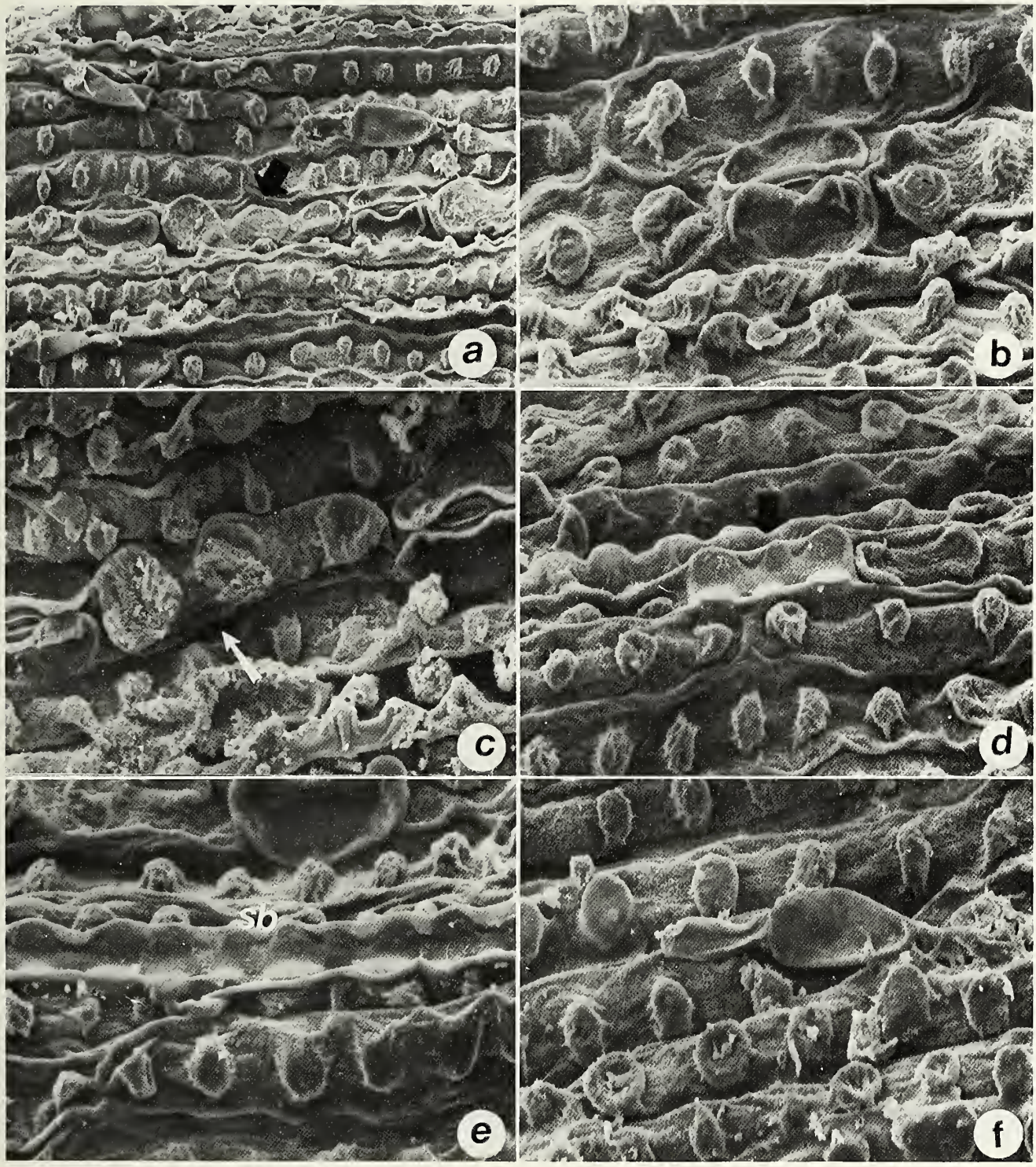

PLATE 54.—Adaxial epidermis *Microstegium nudum*, Thomas 2263: *a*, overview, long cells, interstomatal cell (arrow), ×640; *b*, stoma, ×1250; *c*, interstomatal cell (arrow), ×1250; *d*, long cells, costal silica body (arrow), ×1250; *e*, costal silica bodies (sb), ×1250; *f*, microhair, ×1250.

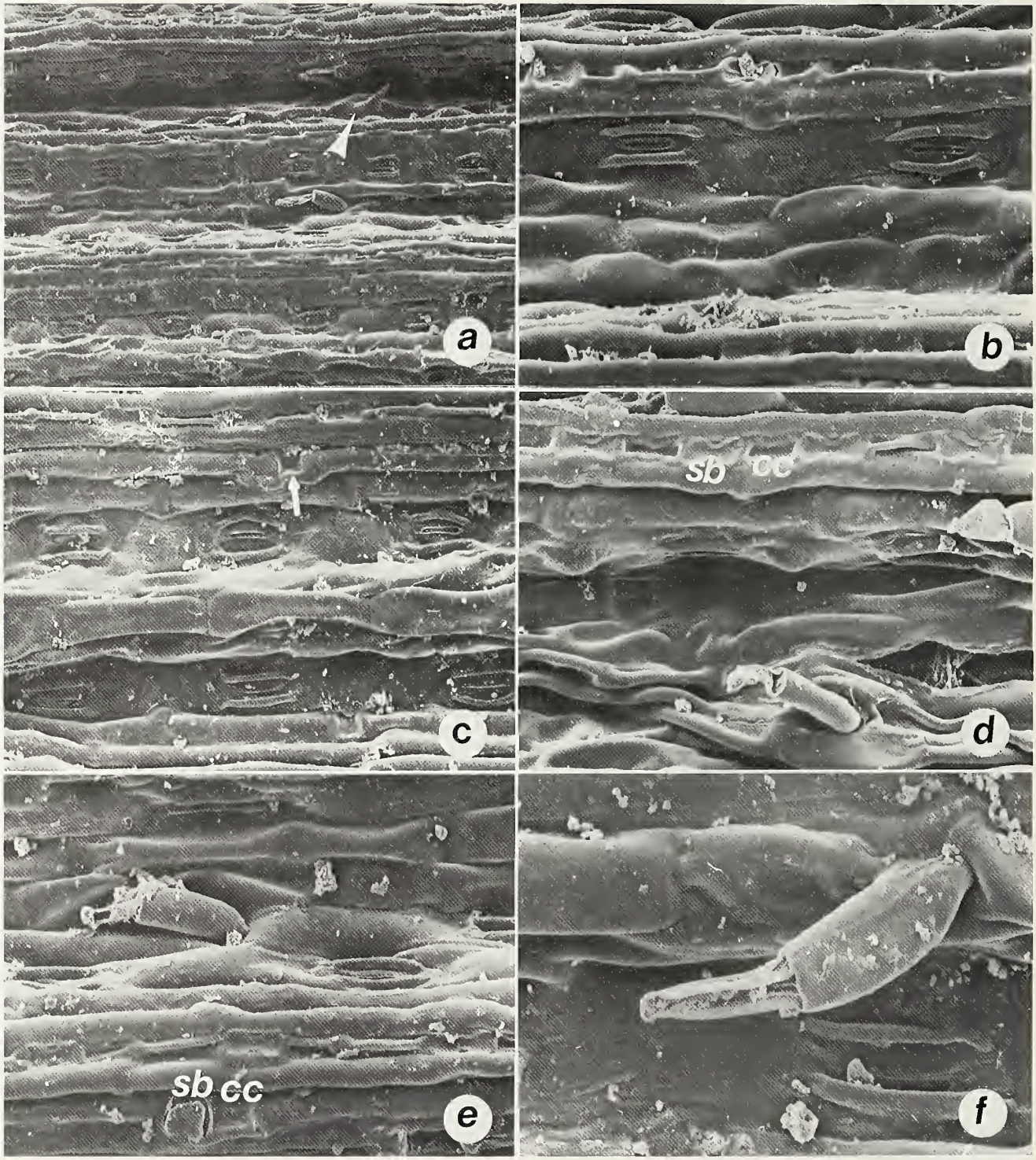

PLATE 55.—Abaxial epidermis *Miscanthus violaceus*, Vesey-Fitzgerald 195: *a*, overview, prickle (arrow), ×240; *b*, stomata, interstomatal cell, long cells, ×640; *c*, interstomatal cells, intercostal cork cell (arrow), long cells, ×480; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

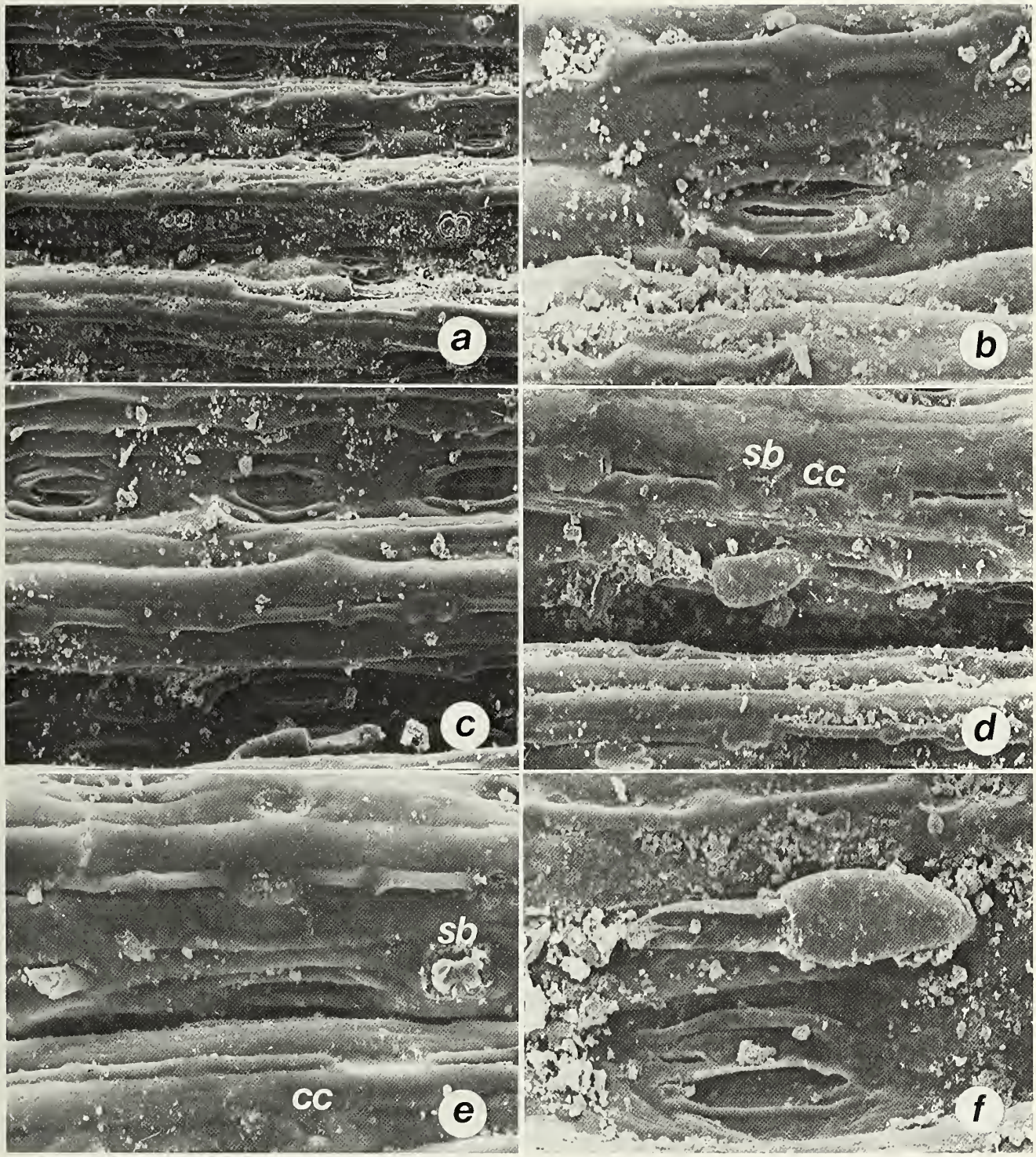

PLATE 56.—Adaxial epidermis *Miscanthus violaceus*, Vesey-Fitzgerald 195: *a*, overview, interstomatal cells, ×320; *b*, stoma, ×1250; *c*, interstomatal cells, long cells, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica bodies (sb), cork cell (cc), ×640; *f*, microhair, ×1250.

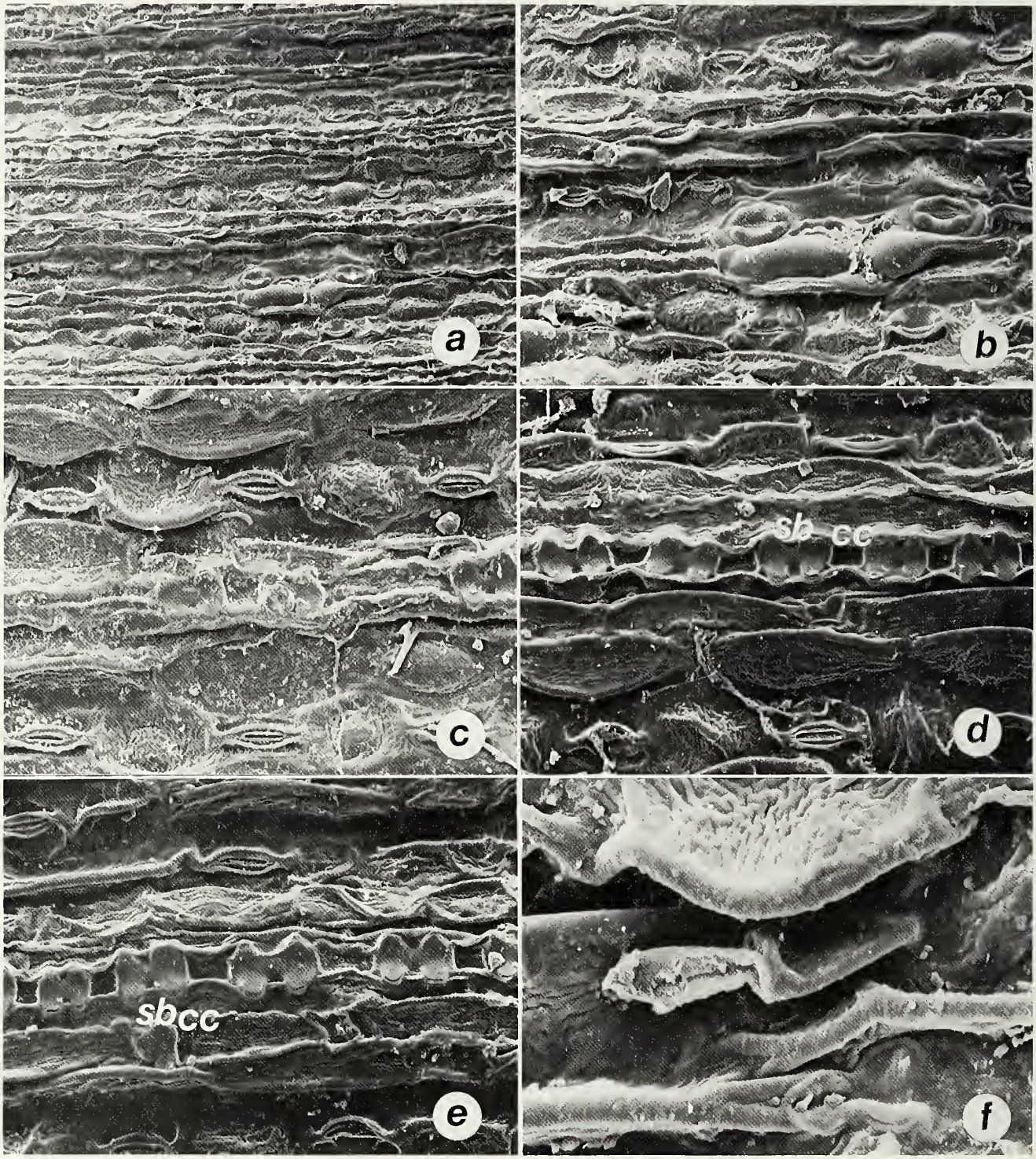

PLATE 57.—Abaxial epidermis *Monocymbium deightonii,* Adam 6837-7: *a,* overview, ×240; *b,* stomata, interstomatal cells, ×480; *c,* interstomatal cells, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×640; *f,* microhair, ×1875.

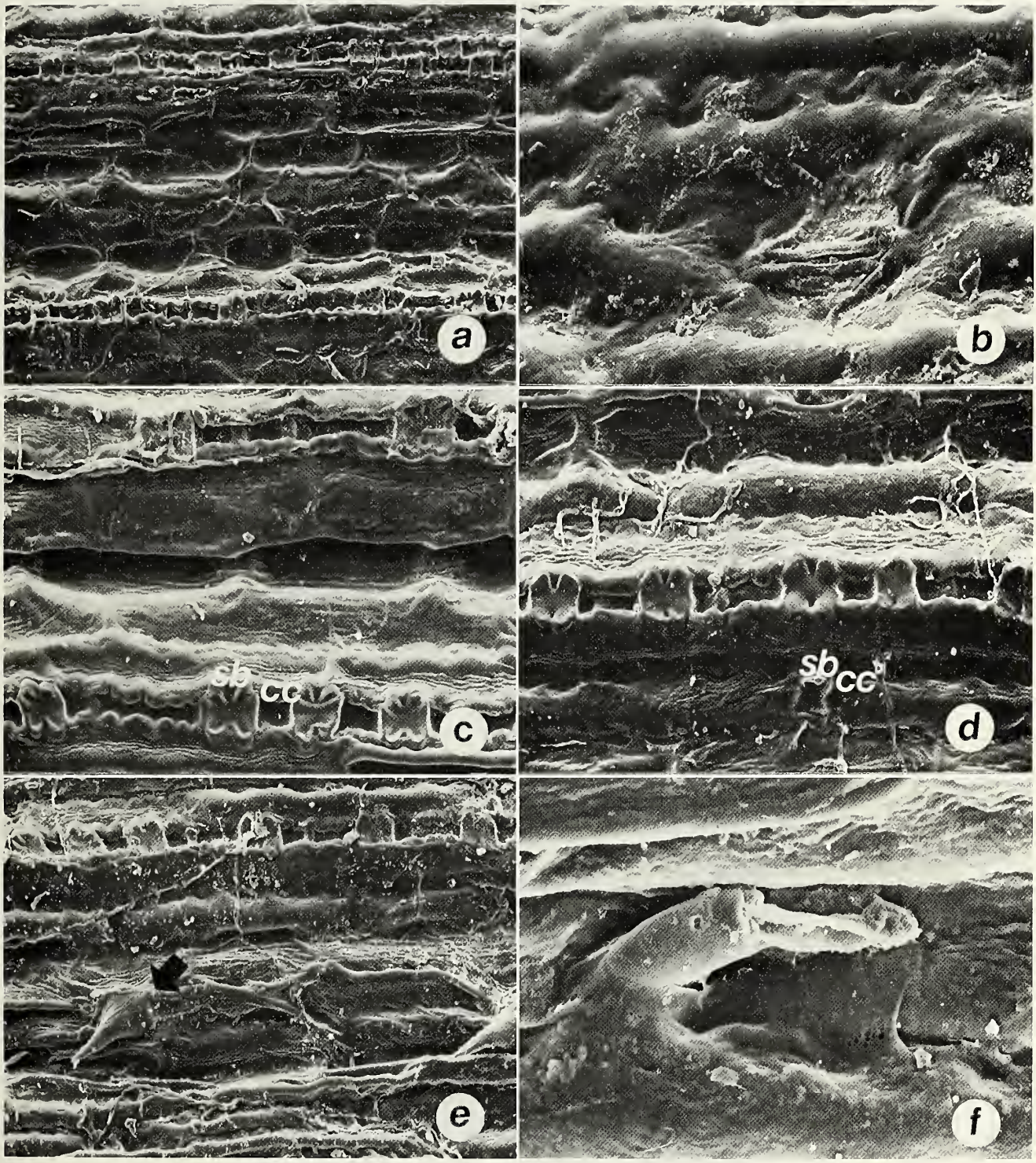

PLATE 58.—Adaxial epidermis *Monocymbium deightonii,* Adam 6837-7: *a,* overview, ×320; *b,* stoma, ×960; *c,* long cells, costal silica bodies (sb), cork cells (cc), ×640; *d,* intercostal silica body (sb), cork cell (cc), ×640; *e,* prickles (arrow), ×480; *f,* microhair, ×1875.

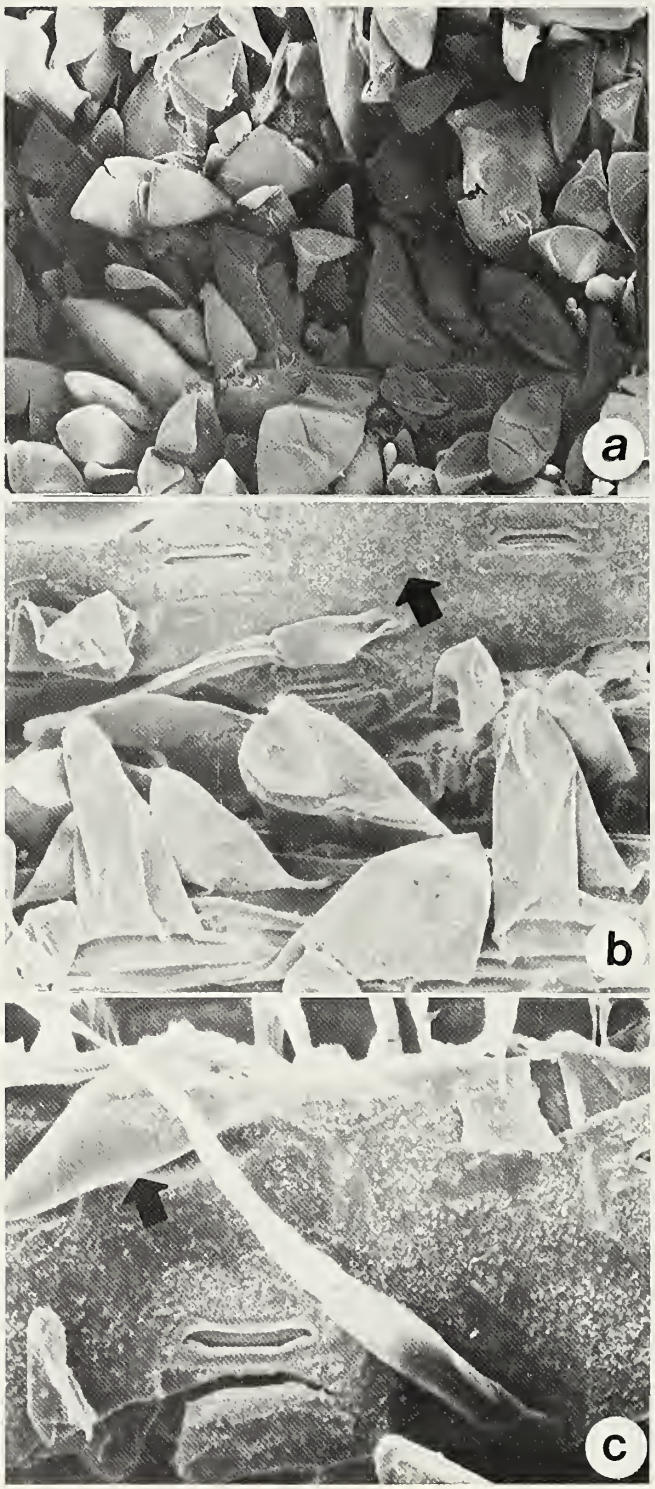

PLATE 59.—Abaxial epidermis *Oxyrhachis gracillima,* Wingfield 587 (*a*), E.A. Robinson 3919 (*b,c*): *a,* papillate long cells, ×240; *b,* stomata, interstomatal cells (arrow), abaxial microhair, ×640; *c,* abaxial microhair, prickle (arrow), ×640.

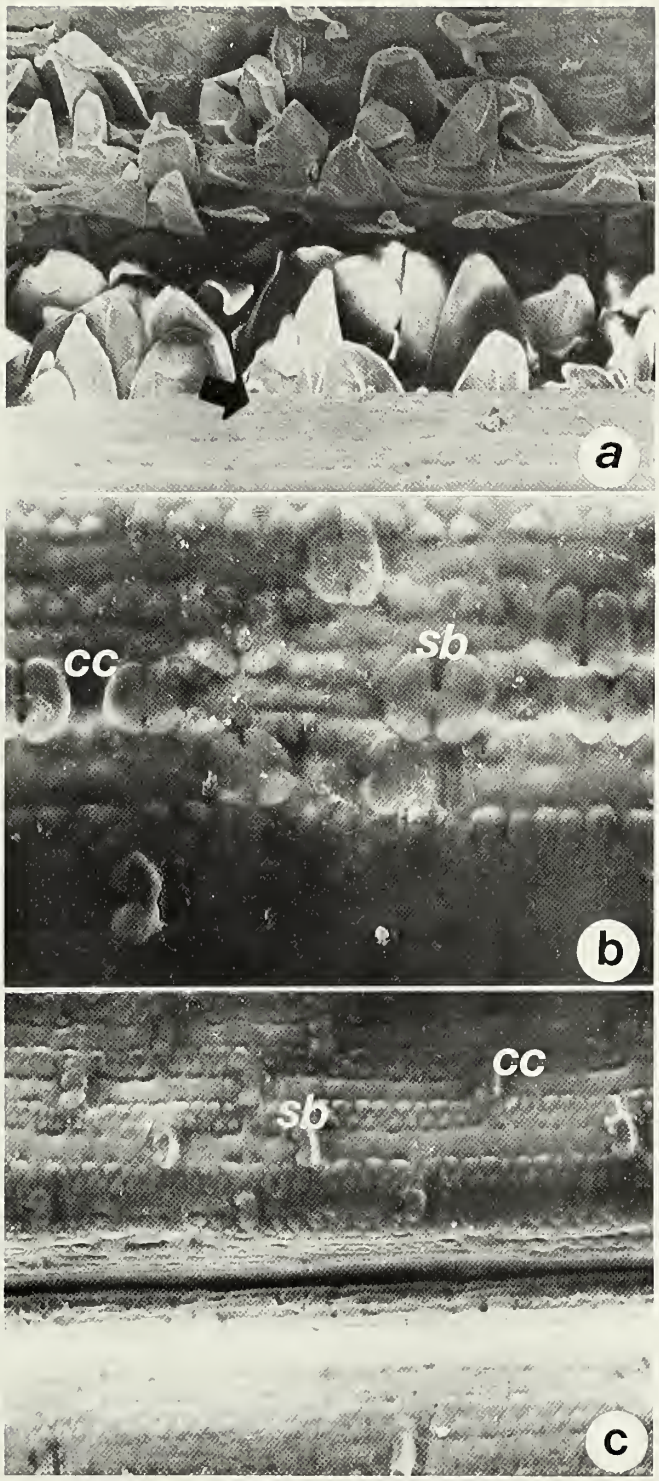

PLATE 60.—Adaxial epidermis *Oxyrhachis gracillima*, Robinson 3919: *a*, long cells (arrow) (upper portion with the papillate long cells is the abaxial surface seen because of rolled leaf), ×320; *b*, silica bodies (sb), cork cells (cc), ×640; *c*, long cells, silica bodies (sb), cork cells (cc), ×320.

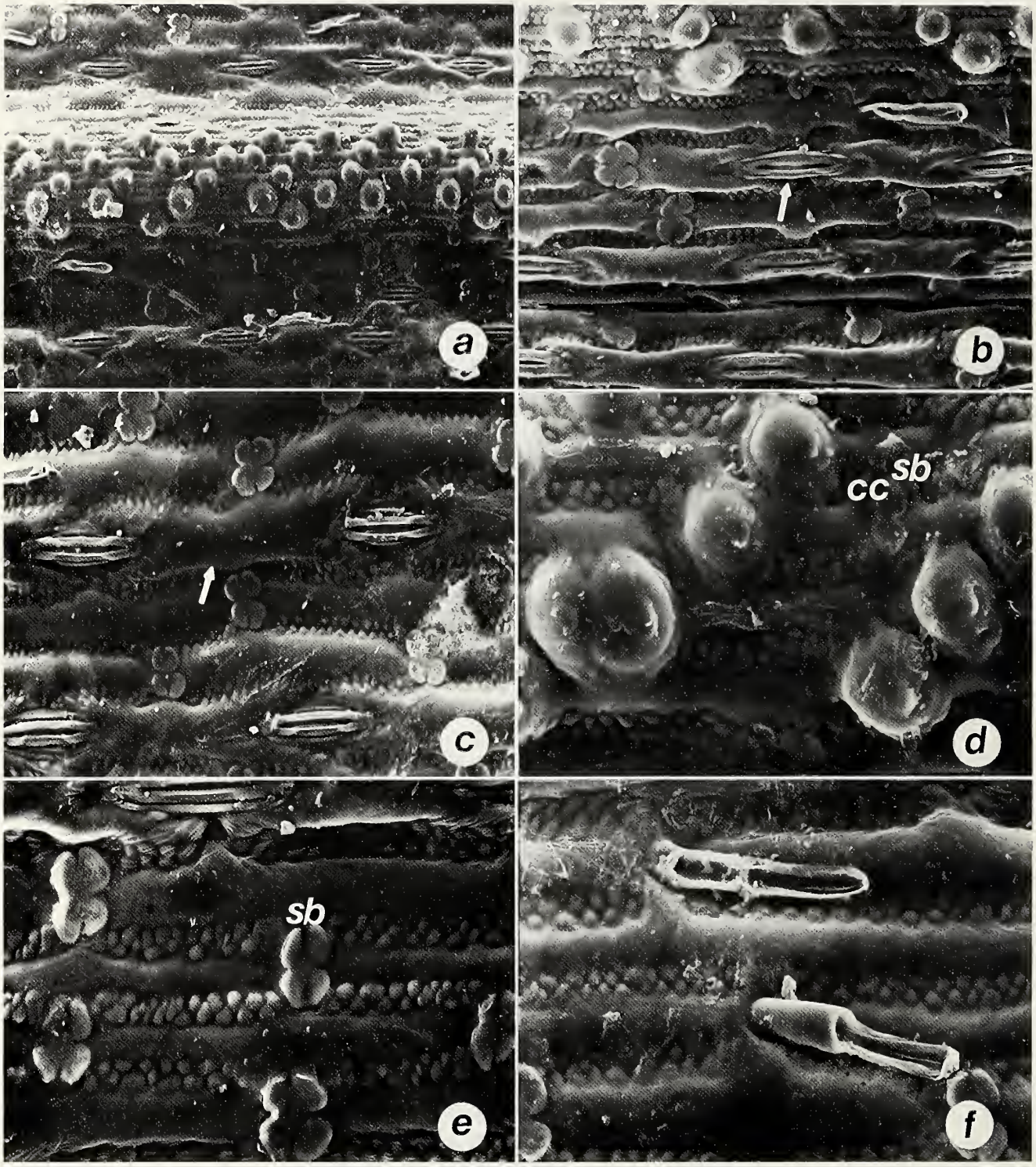

PLATE 61.—Abaxial epidermis *Phacelurus huillensis*, Phipps and Vesey-Fitzgerald 3055: *a*, overview, long cells, papillate prickles, ×176; *b*, stomata (arrow), ×320; *c*, interstomatal cells (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), papillate prickles, ×640; *e*, intercostal silica bodies (sb), ×640; *f*, microhairs, ×704.

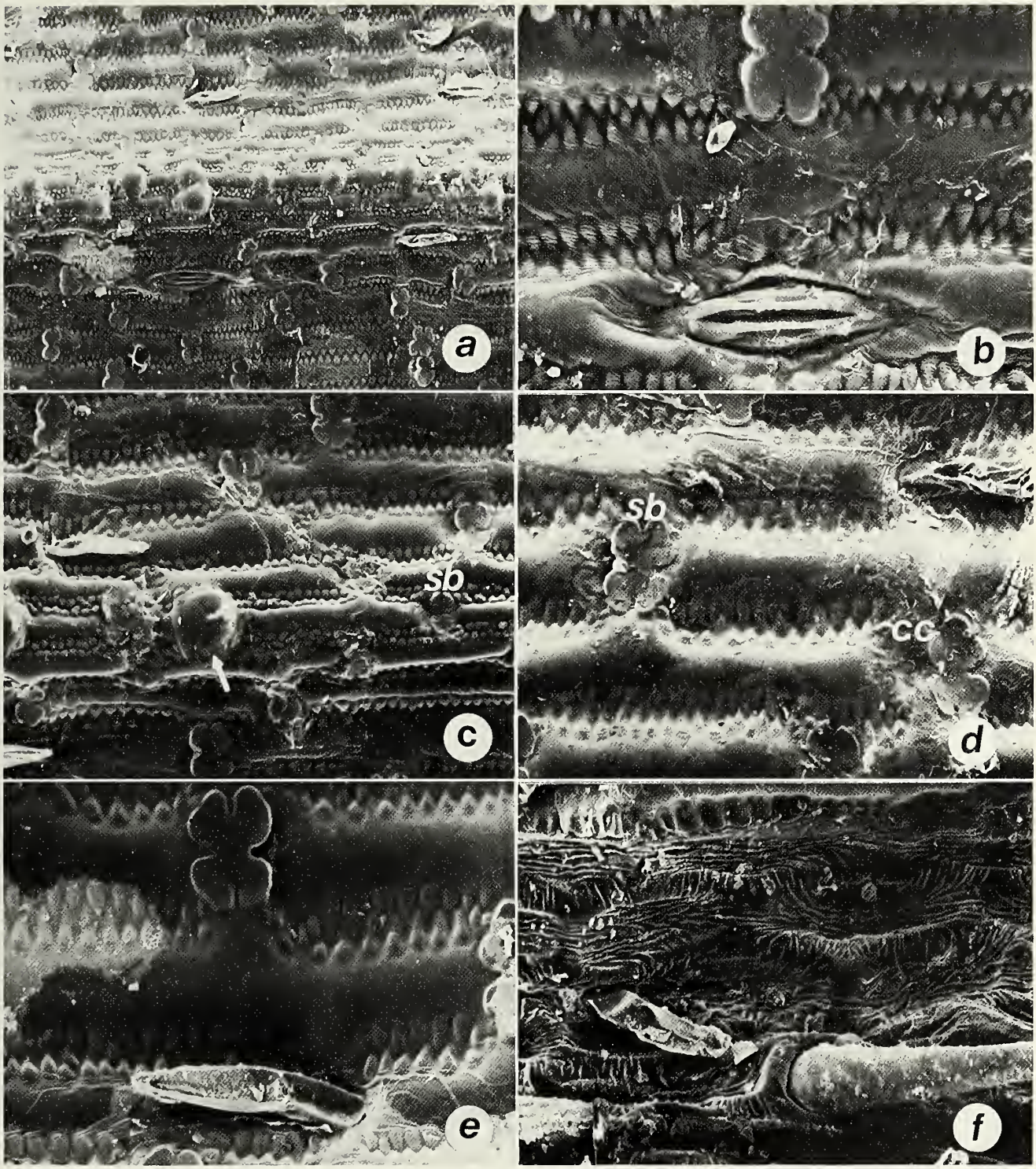

PLATE 62.—Adaxial epidermis *Phacelurus huillensis,* Phipps and Vesey-Fitzgerald 3055: *a,* overview, long cells, ×160; *b,* stoma, ×640; *c,* long cells, papillate prickle (arrow), costal silica body (sb), ×320; *d,* intercostal silica bodies (sb), cork cell (cc), ×480; *e,* microhair, ×640; *f,* base of macrohair, ×480.

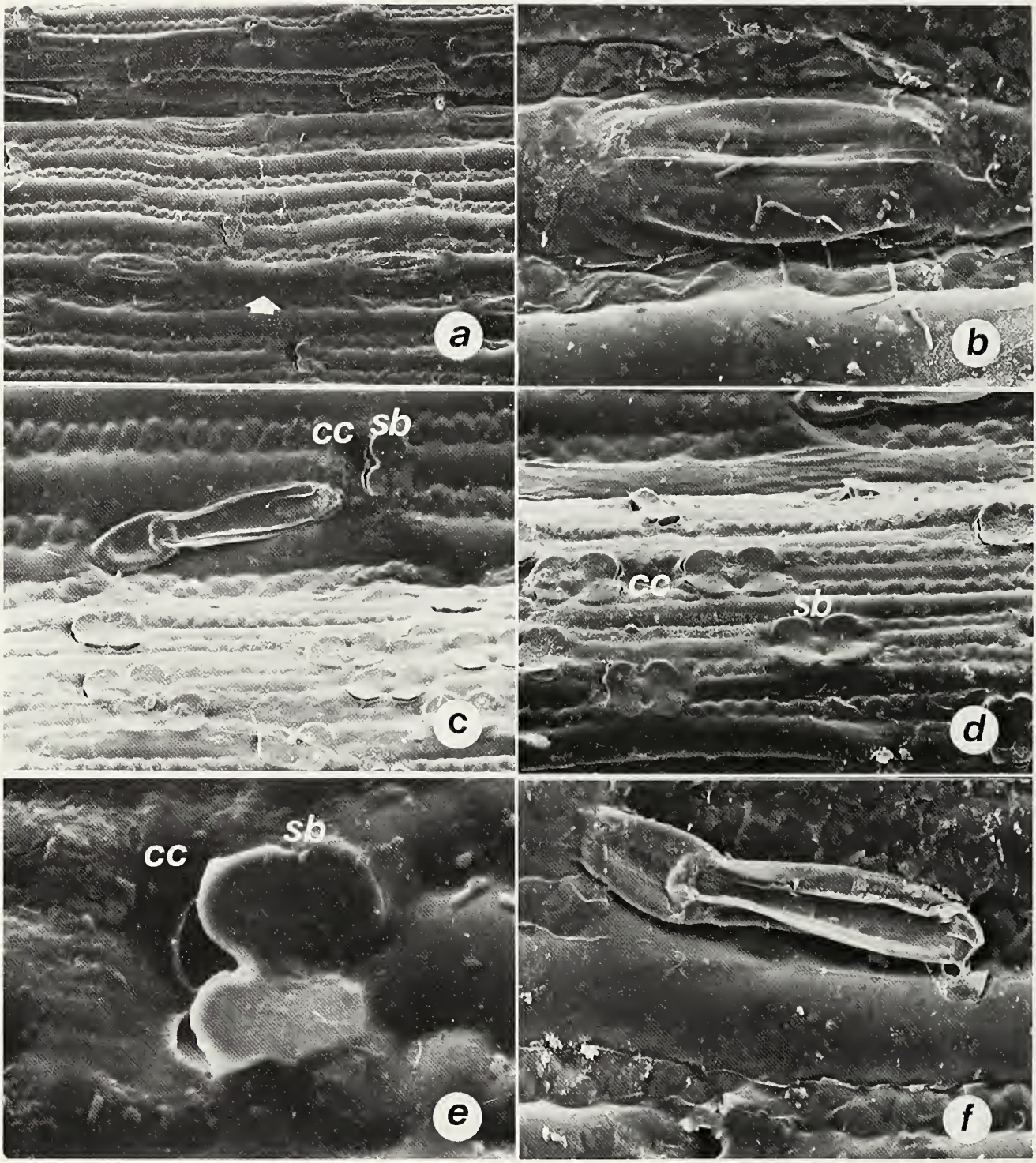

PLATE 63.—Abaxial epidermis *Rhytachne latifolia,* Volleson MRC 2390: *a,* overview, interstomatal cells (arrow), ×320; *b,* stoma, ×1250; *c,* long cells, microhair, intercostal silica body (sb), cork cell (cc), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×2500; *f,* microhair, ×1250.

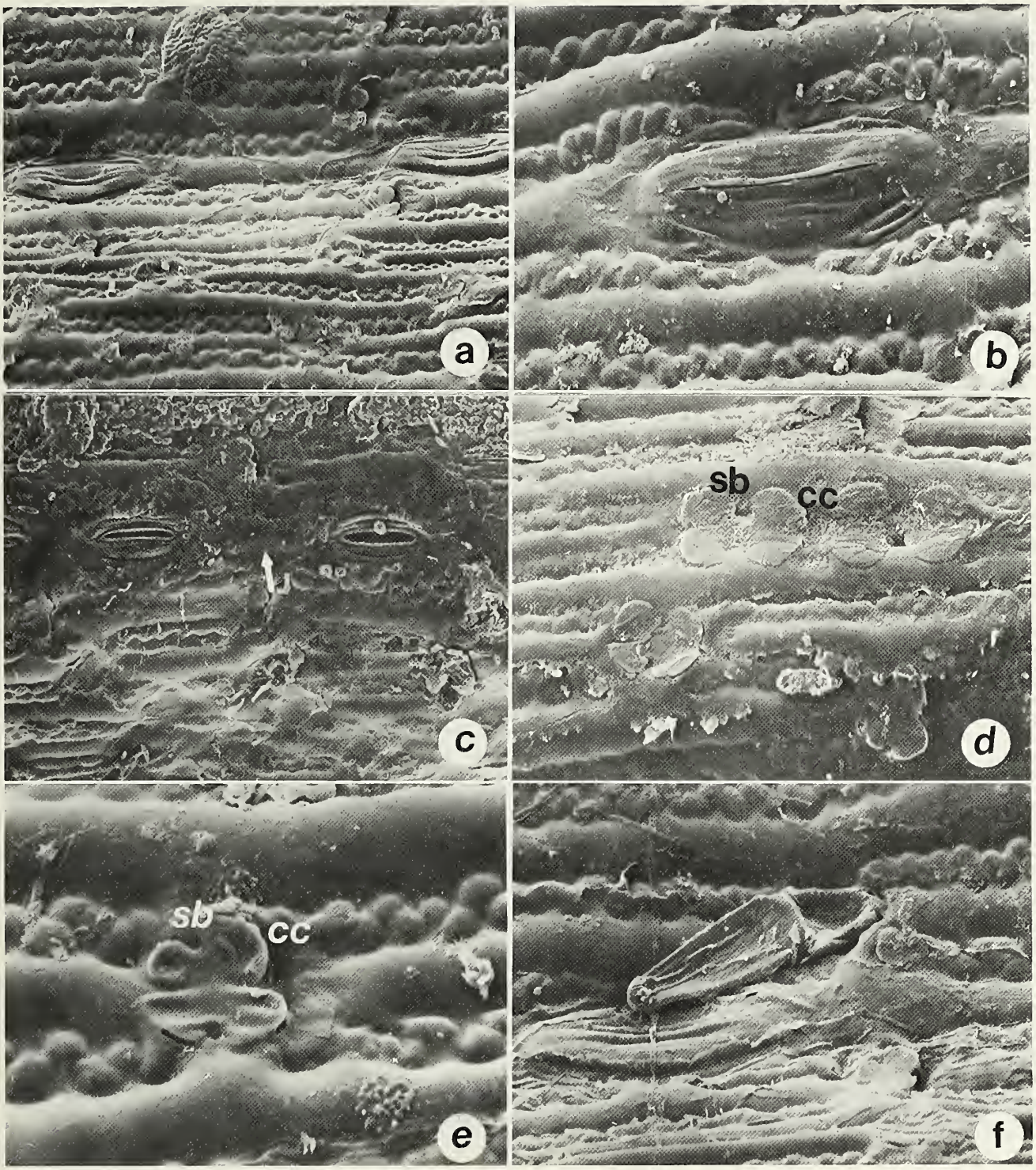

PLATE 64.—Adaxial epidermis *Rhytachne latifolia,* Volleson MRC 2390: *a,* overview, interstomatal cell, long cells, ×320; *b,* stoma, ×640; *c,* interstomatal cell (arrow), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×1250; *f,* microhair, ×640.

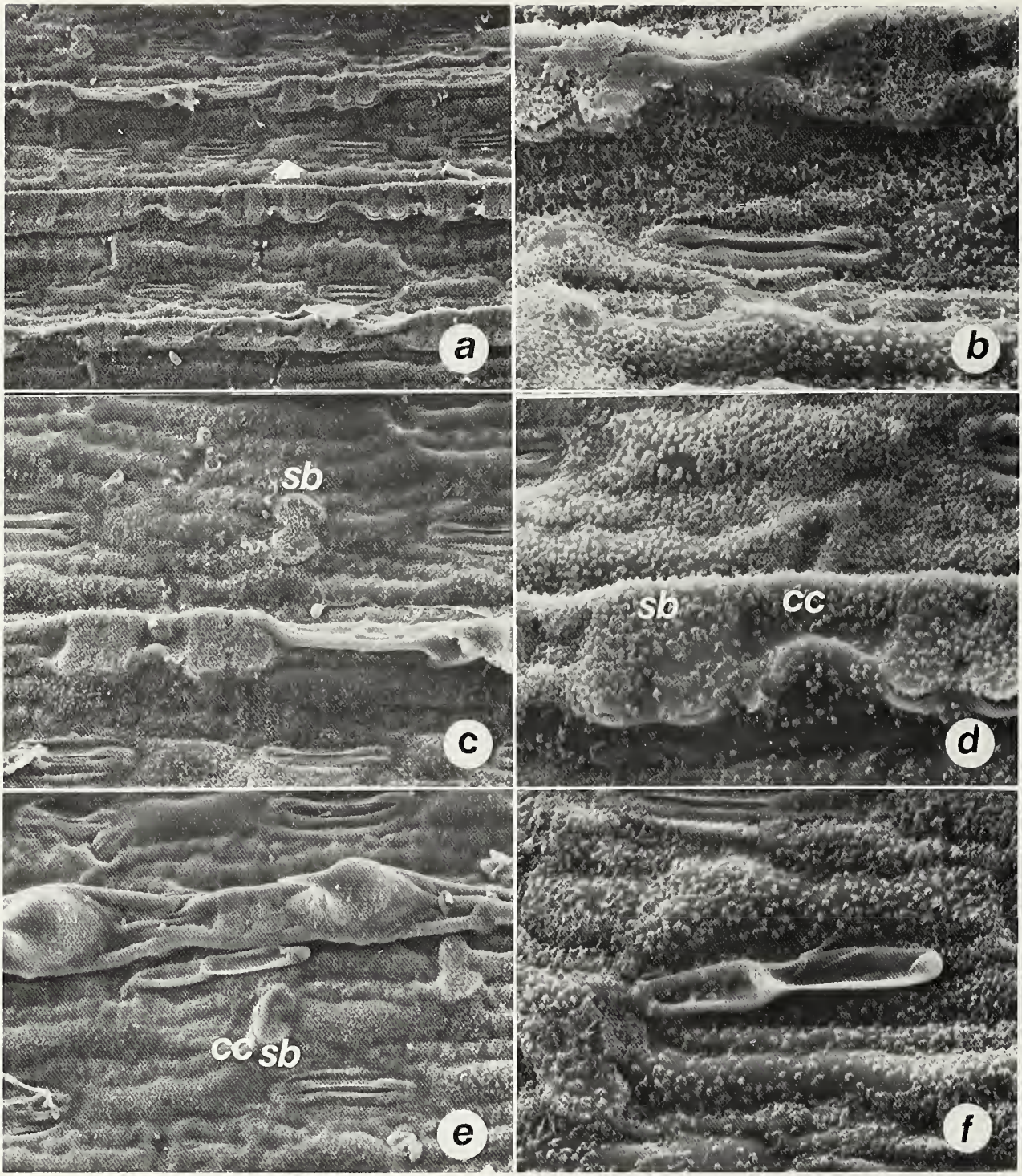

PLATE 65.—Abaxial epidermis *Rottboellia cochinchinensis*, Bjornstad 3368: *a*, overview, interstomatal cells (arrow)×320; *b*, stoma, ×1250; *c*, intercostal silica body (sb), long cells, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, microhair, intercostal silica body (sb), cork cell (cc), ×640; *f*, microhair, ×1250.

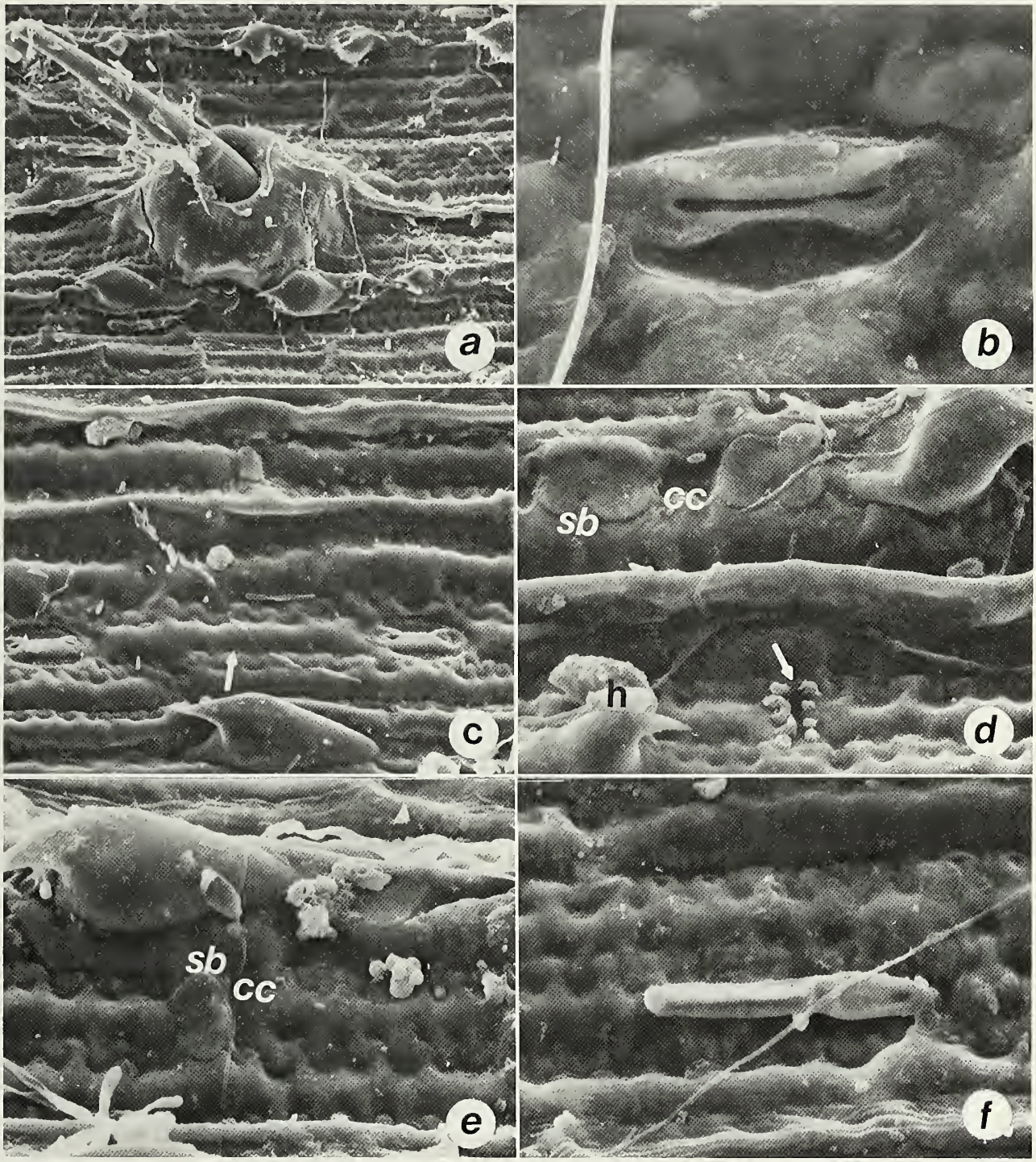

PLATE 66.—Adaxial epidermis *Rottboellia cochinchinensis*, Bjornstad 228: *a*, overview, base of macrohair, ×320; *b*, stoma, ×2500; *c*, interstomatal cell (arrow), long cells, prickle, ×640; *d*, costal silica bodies (sb), cork cells (cc), intercostal cork cell (arrow), hook (h), ×1250; *e*, intercostal silica body (sb), cork cell (cc), ×1250; *f*, microhair, ×1250.

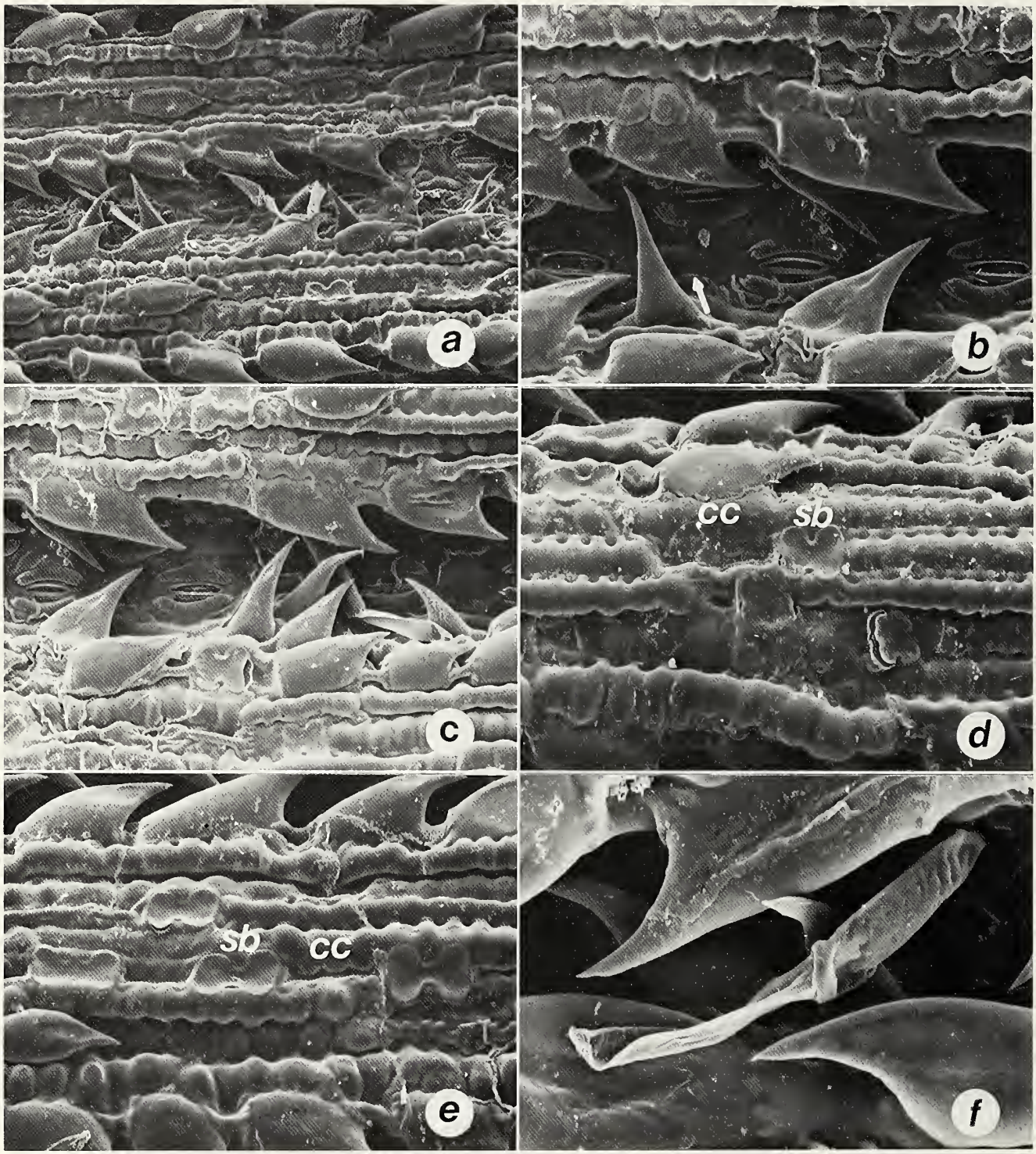

PLATE 67.—Abaxial epidermis *Saccharum spontaneum* subsp. *aegyptiacum*, Thomas 3368: *a*, overview, long cells, ×320; *b*, stomata, interstomatal cells (arrow), ×640; *c*, long cells, prickles, ×480; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

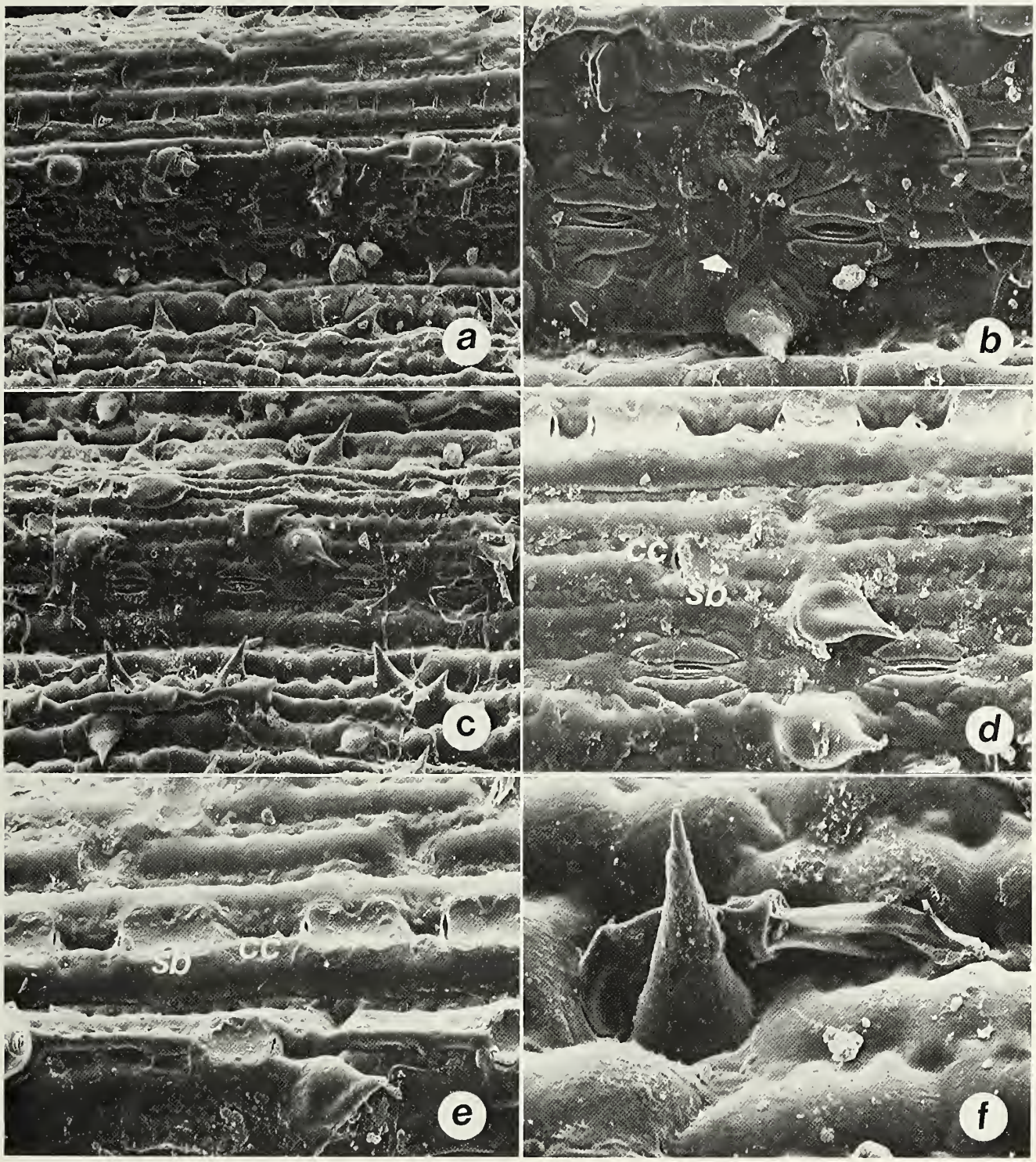

PLATE 68.—Adaxial epidermis *Saccharum spontaneum* subsp. *aegyptiacum*, Thomas 3368: *a*, overview, long cells, ×240; *b*, stomata, interstomatal cells (arrow), ×640; *c*, interstomatal cells, long cells, prickles, ×320; *d*, intercostal silica body (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

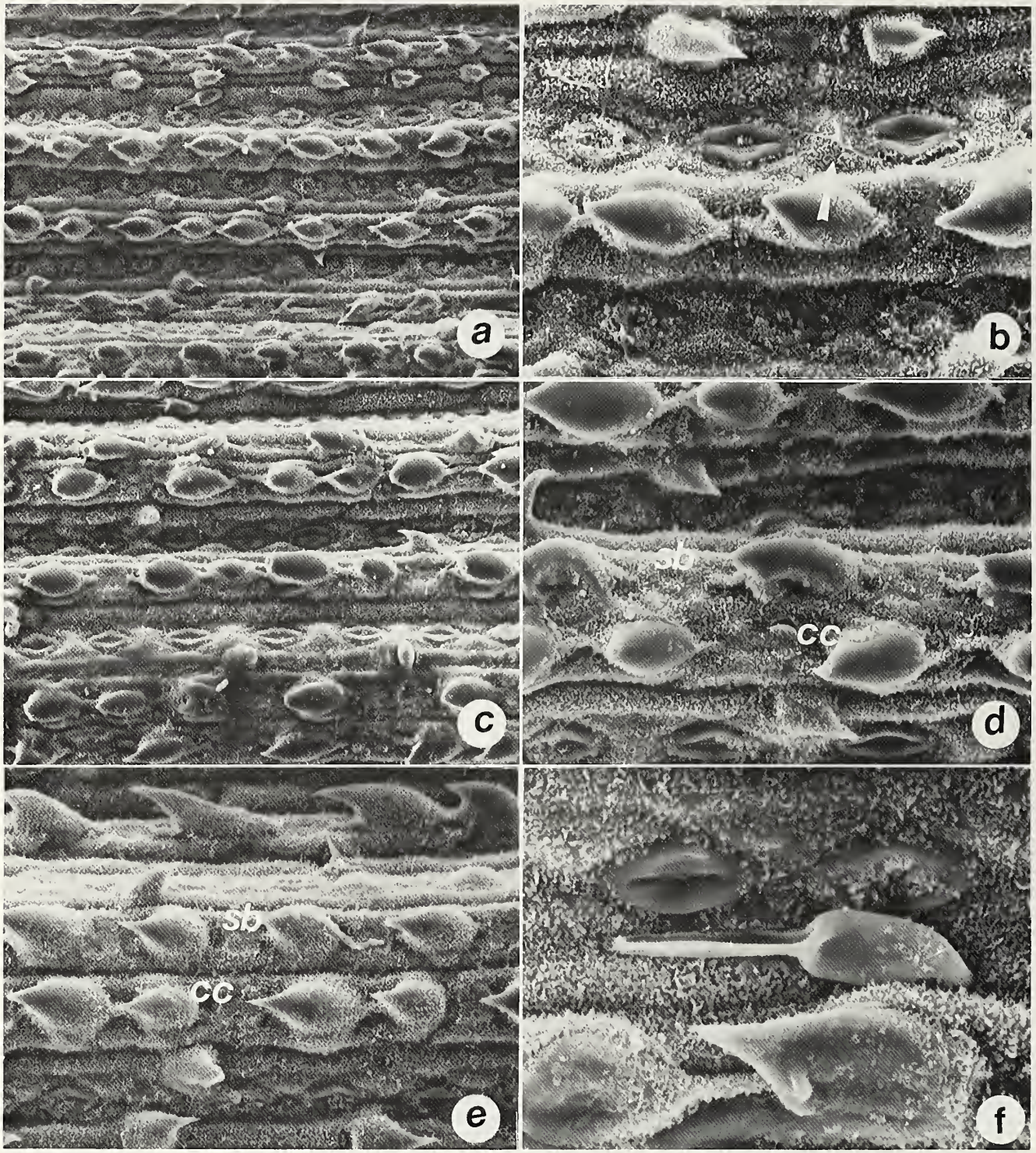

PLATE 69.—Abaxial epidermis *Schizachyrium rupestre,* Adam 24,260: *a,* overview, long cells, ×264; *b,* stomata, interstomatal cells (arrow), ×704; *c,* interstomatal cells, long cells, ×352; *d,* costal silica bodies (sb), cork cells (cc), ×704; *e,* prickles, costal silica bodies (sb), cork cells (cc), ×527; *f,* microhair, ×1375.

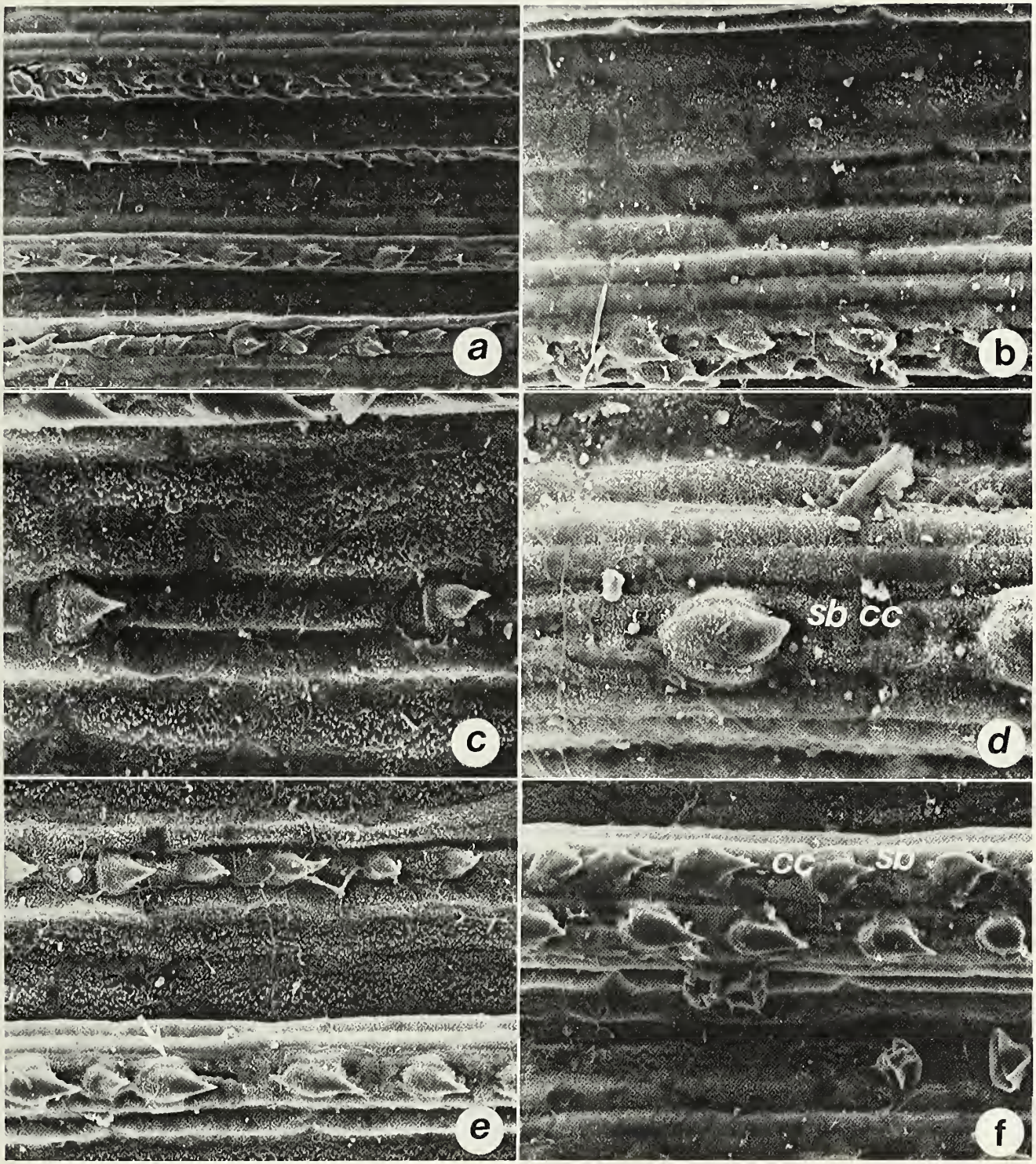

PLATE 70.—Adaxial epidermis *Schizachyrium rupestre,* Adam 24,260: *a,* overview, long cells, ×160; *b,* long cells, ×320; *c,* intercostal hooks, ×480; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* costal prickles (arrow), intercostal hooks, ×320; *f,* costal silica bodies (sb), cork cells (cc), ×320.

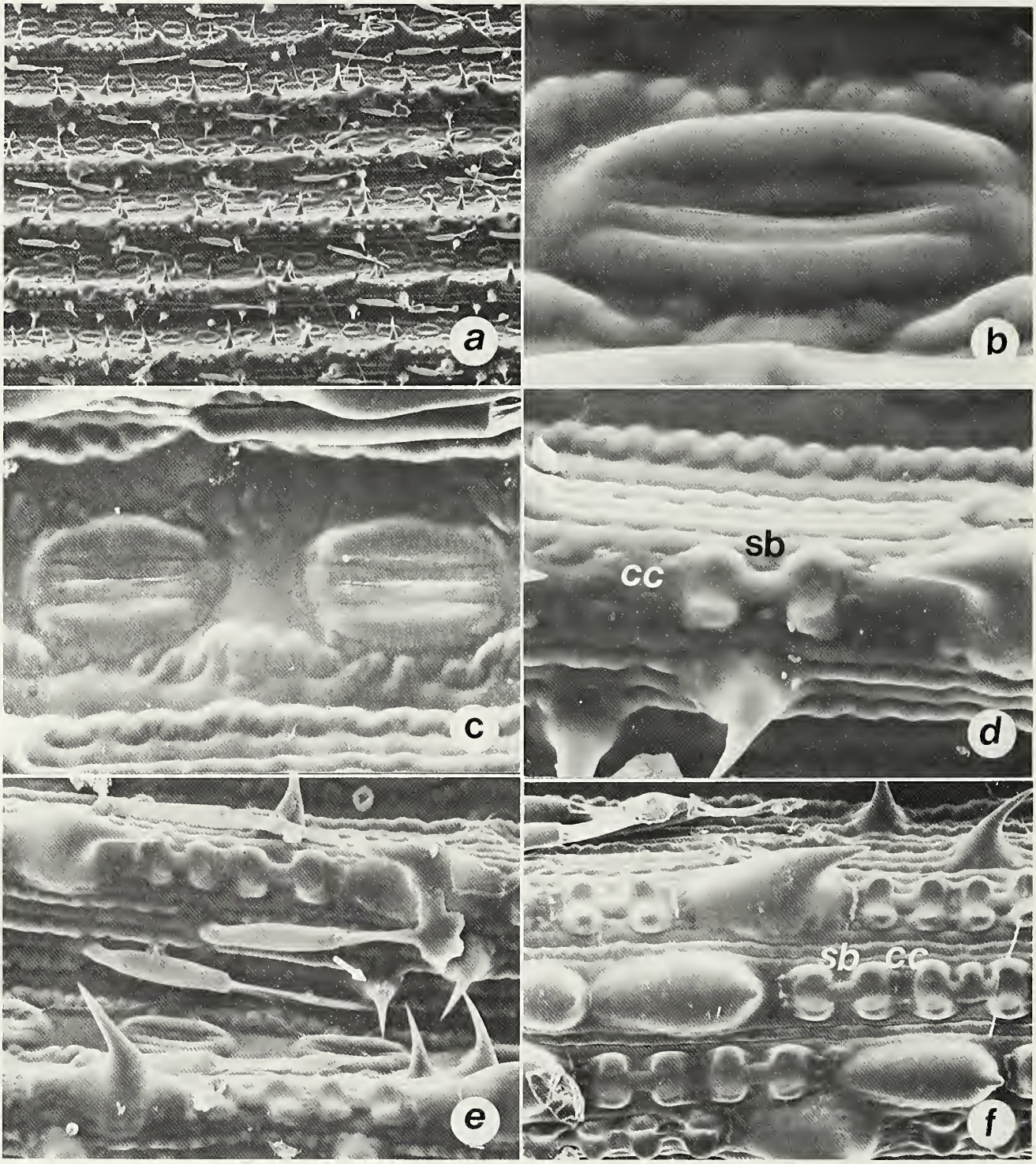

PLATE 71.—Abaxial epidermis *Sehima nervosum,* Hudson 271: *a,* overview, interstomatal cells, prickles, ×160; *b,* stoma, ×2500; *c,* interstomatal cell, ×1250; *d,* long cells, costal silica bodies (sb), cork cells (cc), ×1250; *e,* microhairs, intercostal hooks (arrow), ×640; *f,* costal silica bodies (sb), cork cells (cc), costal prickles, ×640.

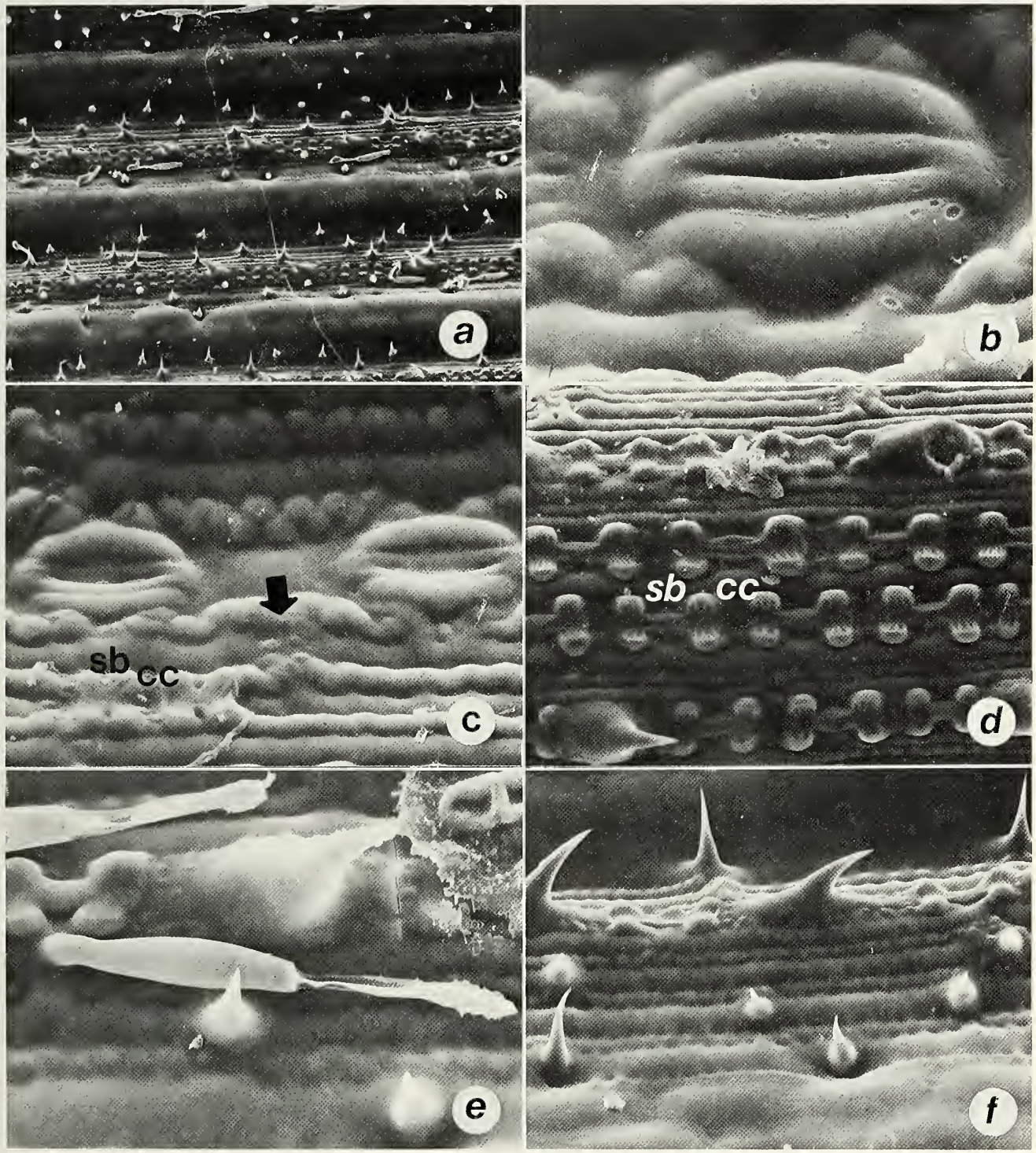

PLATE 72.—Adaxial epidermis *Sehima nervosum*, Hudson 271: *a*, overview, ×160; *b*, stoma, ×2500; *c*, stomata, interstomatal cell, intercostal cork cell (arrow), costal silica bodies (sb), cork cells (cc), ×1250; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, microhairs, ×1250; *f*, costal prickles, intercostal hooks, ×640.

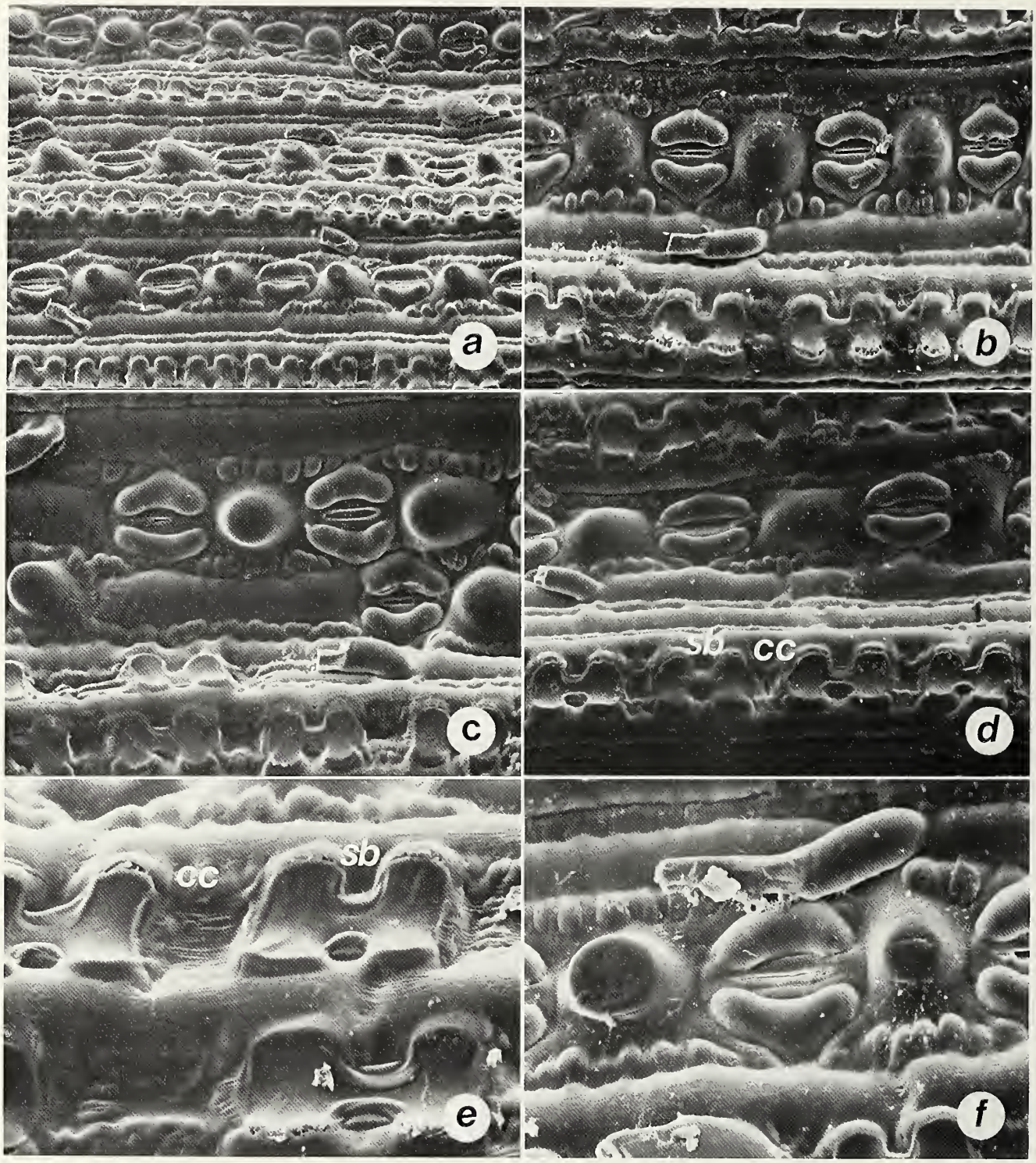

PLATE 73.—Abaxial epidermis *Sorghastrum bipennatum,* Greenway and Kanuri 15,464: *a,* overview, long cells, ×320; *b,* stomata, ×640; *c,* interstomatal cells, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* costal silica bodies (sb), cork cell (cc), ×1250; *f,* microhair, ×1250.

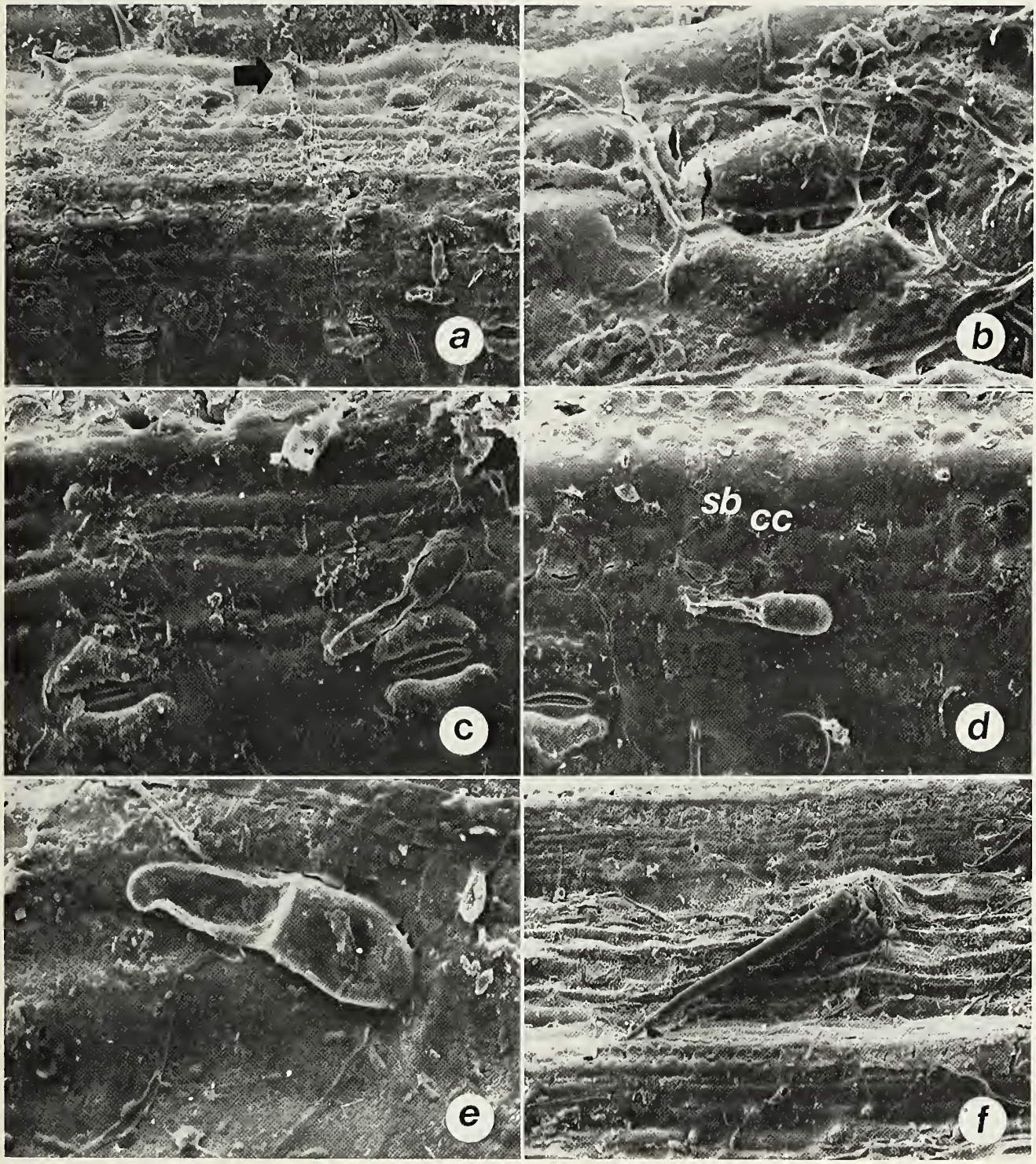

PLATE 74.—Adaxial epidermis *Sorghastrum bipennatum,* Greenway and Kanuri 15,464: *a,* overview, prickles (arrow), ×320; *b,* stoma, ×1250; *c,* interstomatal cell, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* macrohair, ×160.

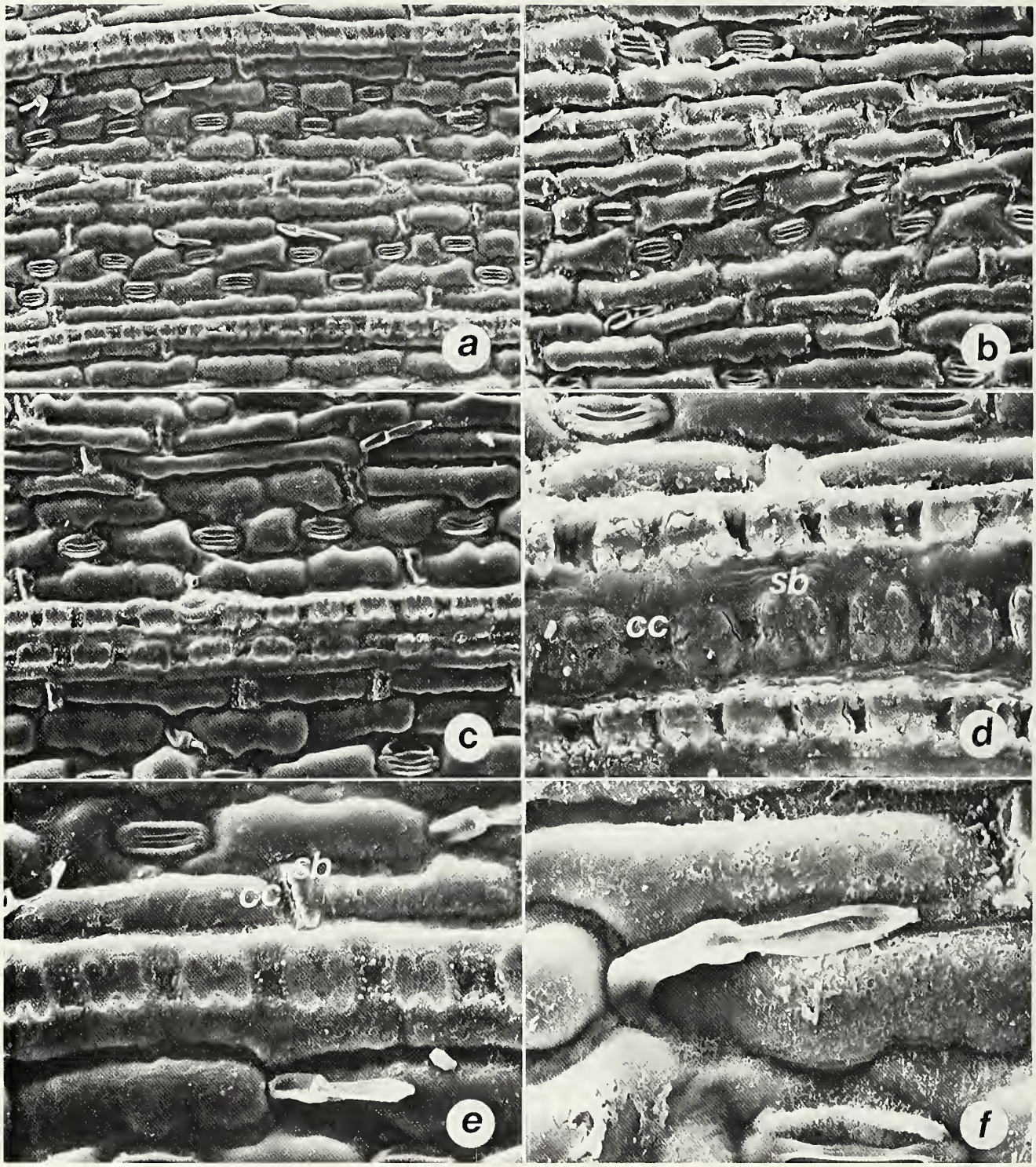

PLATE 75.—Abaxial epidermis *Sorghum arundinaceum*, Myre 26: *a*, overview, long cells, ×240; *b*, stomata, interstomatal cells, ×320; *c*, interstomatal cells, long cells, ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica body (sb), cork cell (cc), ×640; *f*, microhair, ×1250.

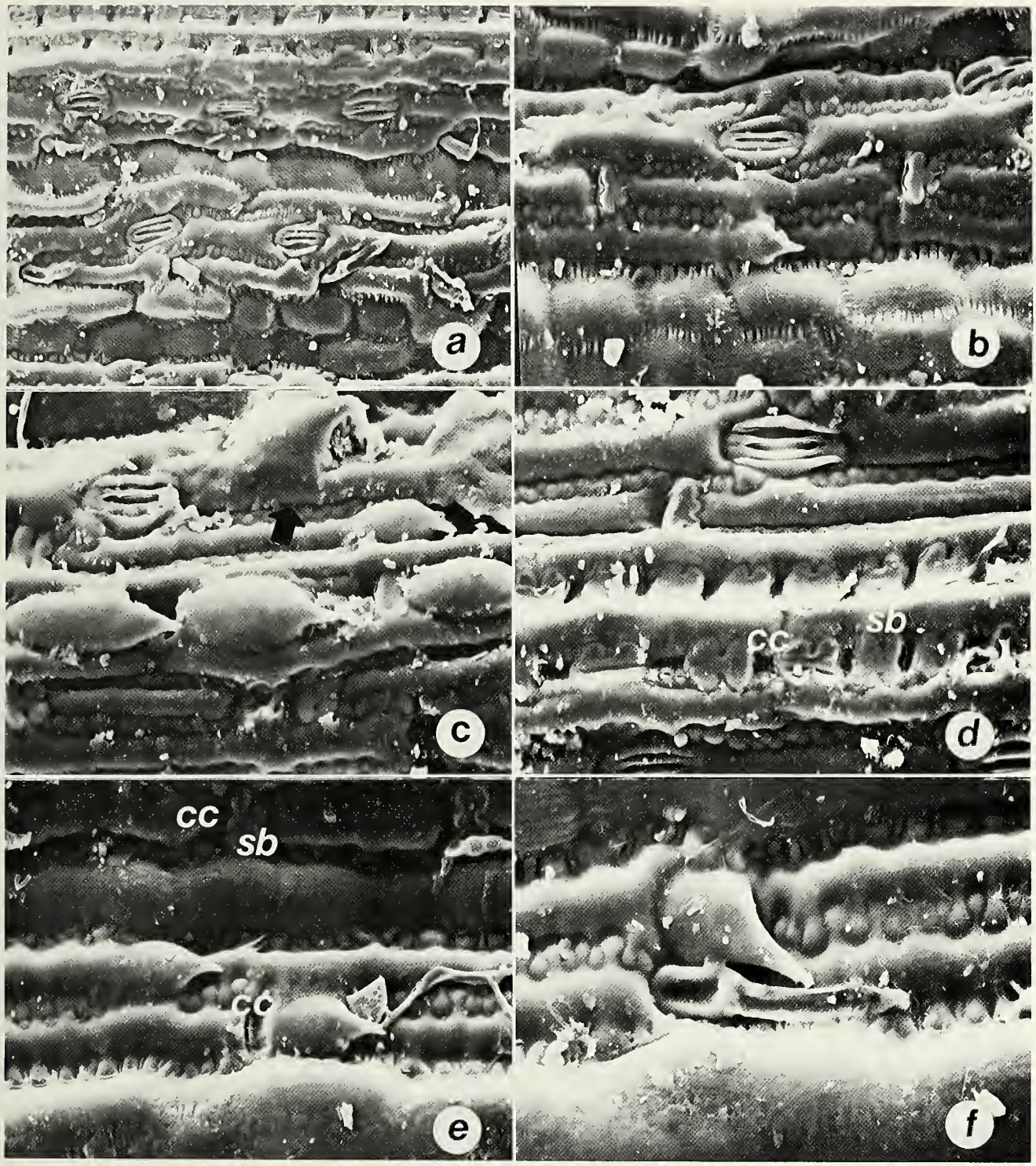

PLATE 76.—Adaxial epidermis *Sorghum arundinaceum,* Myre 26: *a,* overview, long cells, ×320; *b,* stoma, interstomatal cells, long cells, ×480; *c,* interstomatal cell (arrow), long cells, prickles, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica bodies (sb), cork cells (cc), ×640; *f,* microhair, ×960.

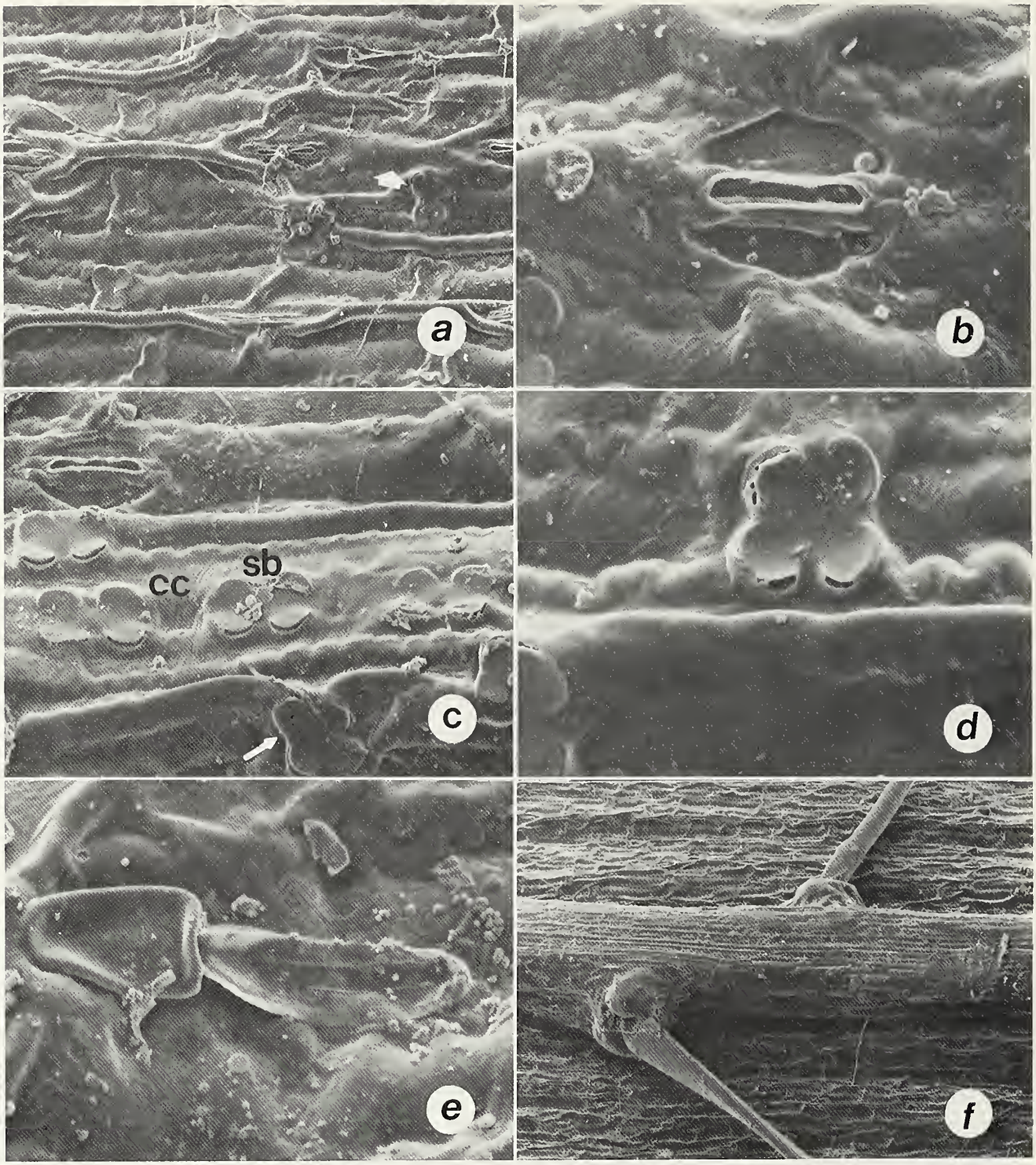

PLATE 77.—Abaxial epidermis *Thelepogon elegans*, Richard 19,914: *a*, overview, interstomatal cell (arrow), ×320; *b*, stoma, ×1250; *c*, costal silica bodies (sb), cork cells (cc), intercostal silica body (arrow), ×640; *d*, intercostal silica body, ×1250; *e*, microhair, ×1250; *f*, macrohairs on midvein, ×80.

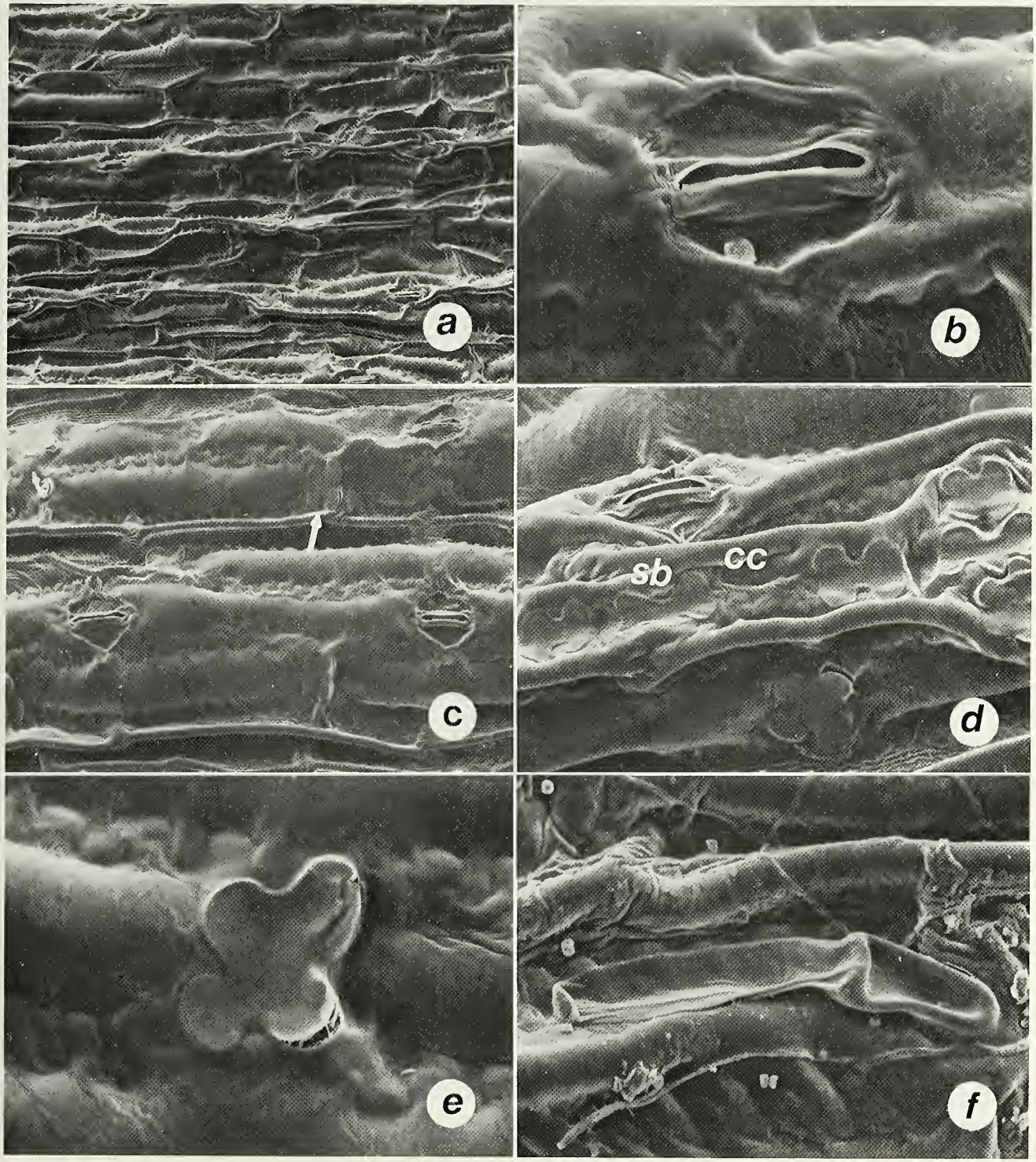

PLATE 78.—Adaxial epidermis *Thelepogon elegans*, Richard 19,914: *a*, overview, ×160; *b*, stoma, ×1250; *c*, interstomatal cell, long cells, intercostal silica body (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica body, ×1250; *f*, microhair, ×1250.

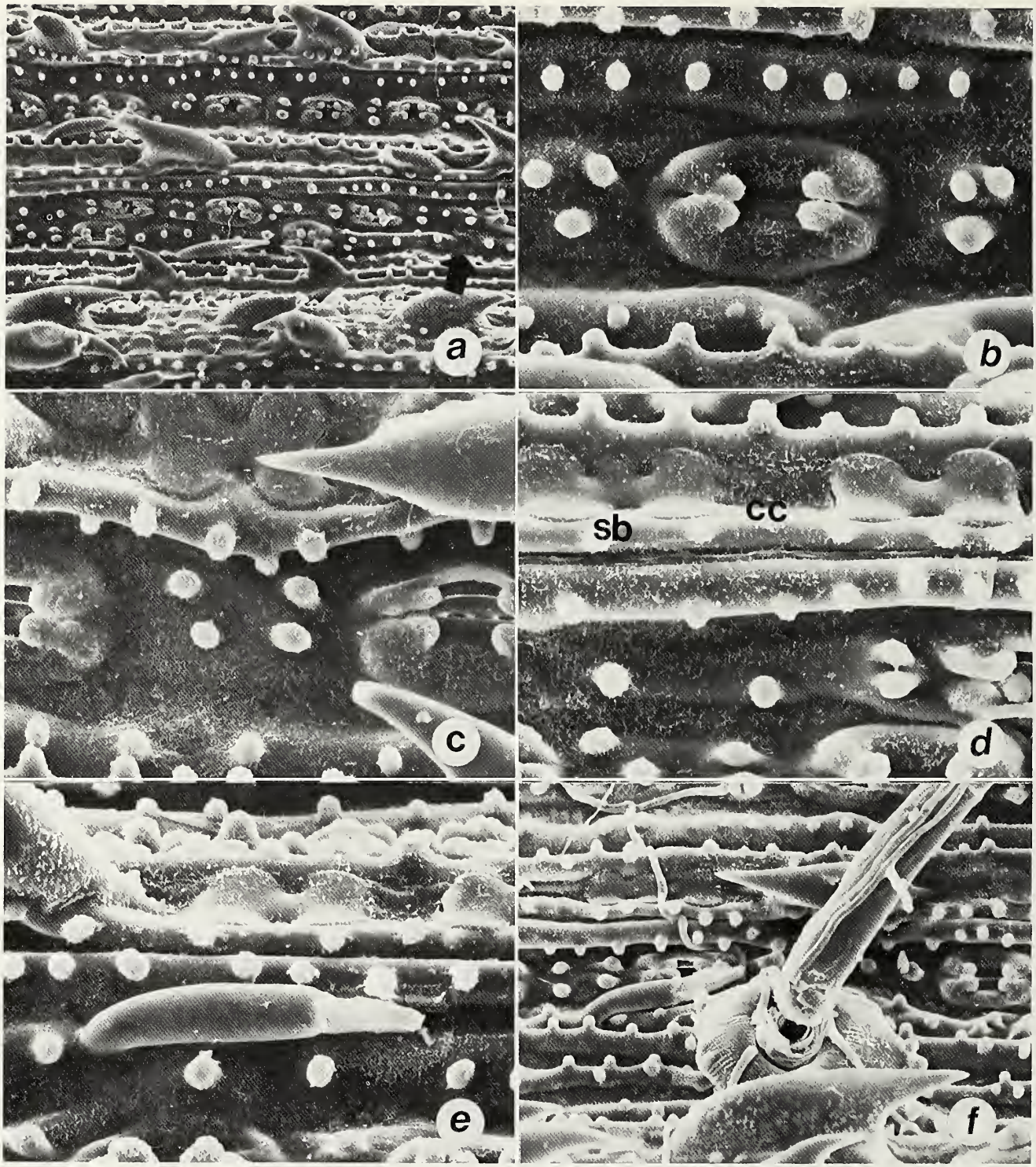

PLATE 79.—Abaxial epidermis *Themeda triandra,* Shantz 255: *a,* overview, prickles, intercostal cork cell (arrow), ×320; *b,* stoma, ×1250; *c,* interstomatal cell, ×1250; *d,* costal silica bodies (sb), cork cell (cc), ×1250; *e,* microhair, ×1250; *f,* base of macrohair, ×640.

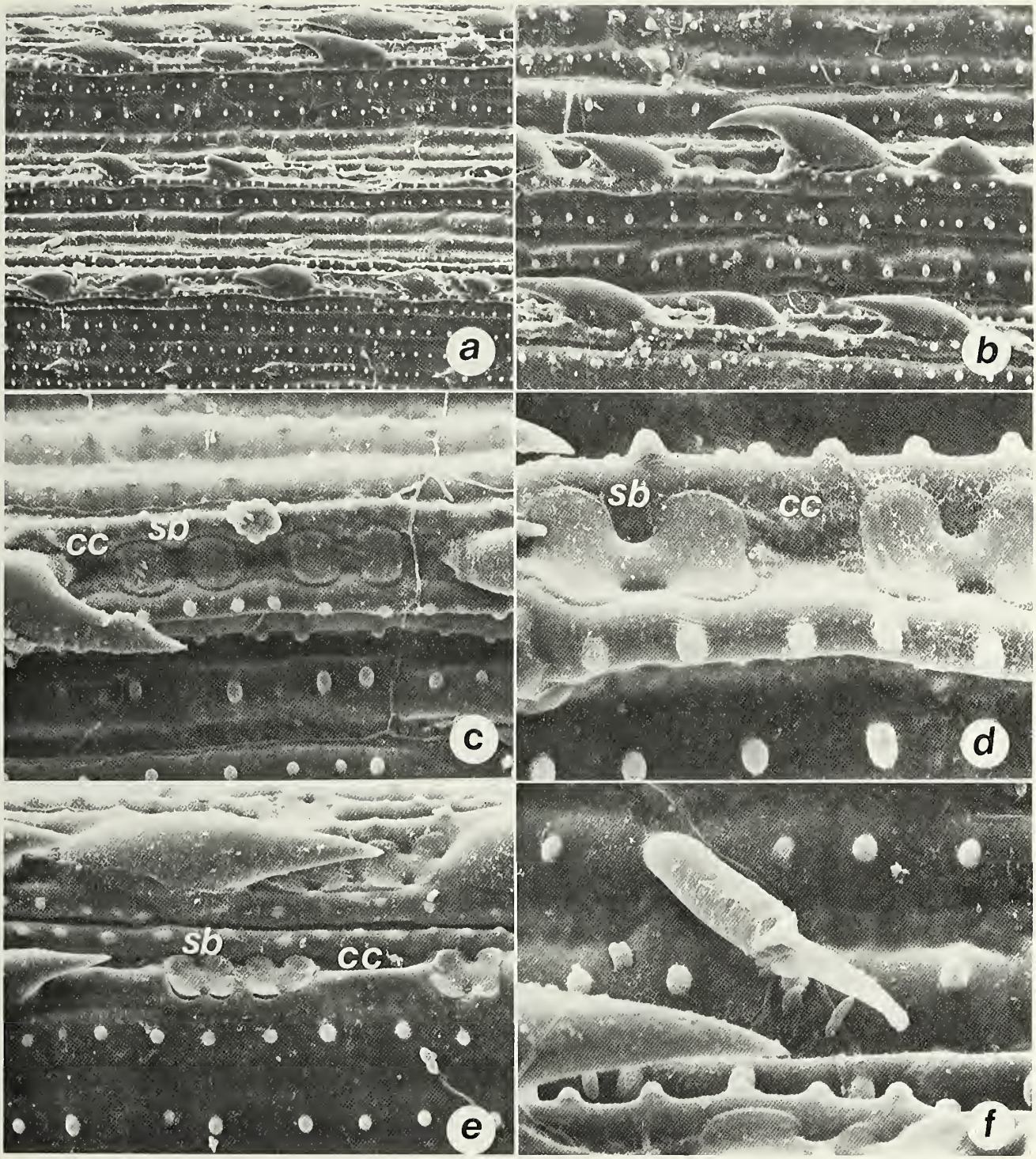

PLATE 80.—Adaxial epidermis *Themeda triandra*, Shantz 255: *a*, overview, ×160; *b*, long cells, ×320; *c*, long cells, costal silica bodies (sb), cork cells (cc), ×640; *d*, costal silica bodies (sb), cork cells (cc), ×1250; *e*, costal prickles, silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

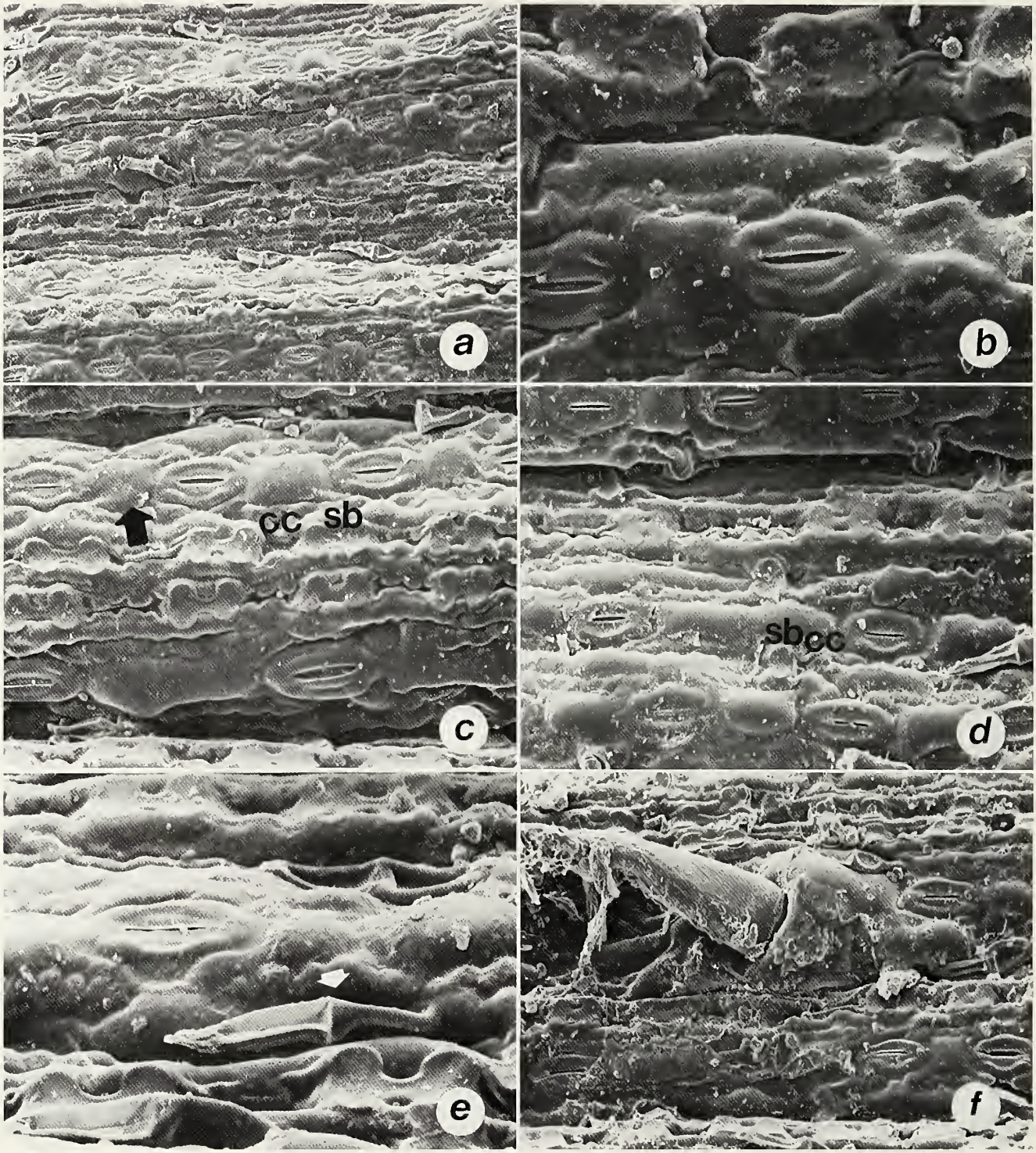

PLATE 81.—Abaxial epidermis *Trachypogon spicatus,* Bouxin et Radoux 1150: *a,* overview, long cells, interstomatal cells, ×320; *b,* stomata, ×960; *c,* long cells, interstomatal cells (arrow), costal silica bodies (sb), cork cells (cc), ×640; *d,* intercostal silica bodies (sb), cork cells (cc), ×640; *e,* microhair (arrow), ×1250; *f,* base of macrohair, ×480.

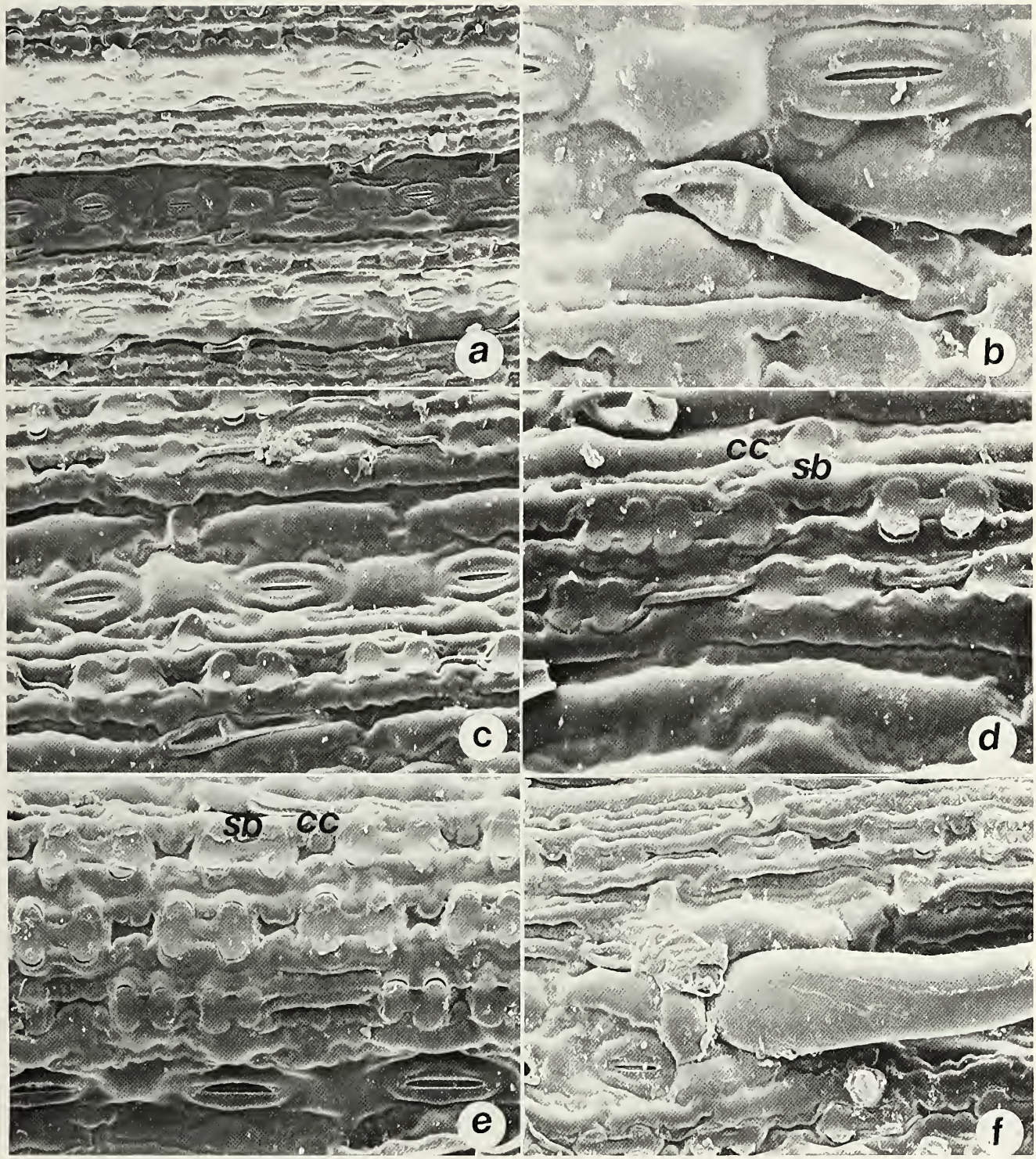

PLATE 82.—Adaxial epidermis *Trachypogon spicatus*, Bouxin et Radoux 1150: *a*, overview, long cells, 320; *b*, stoma, microhair, ×1250; *c*, interstomatal cells, long cells, ×640; *d*, intercostal silica bodies (sb), cork cells (cc), ×960; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, base of macrohair, ×640.

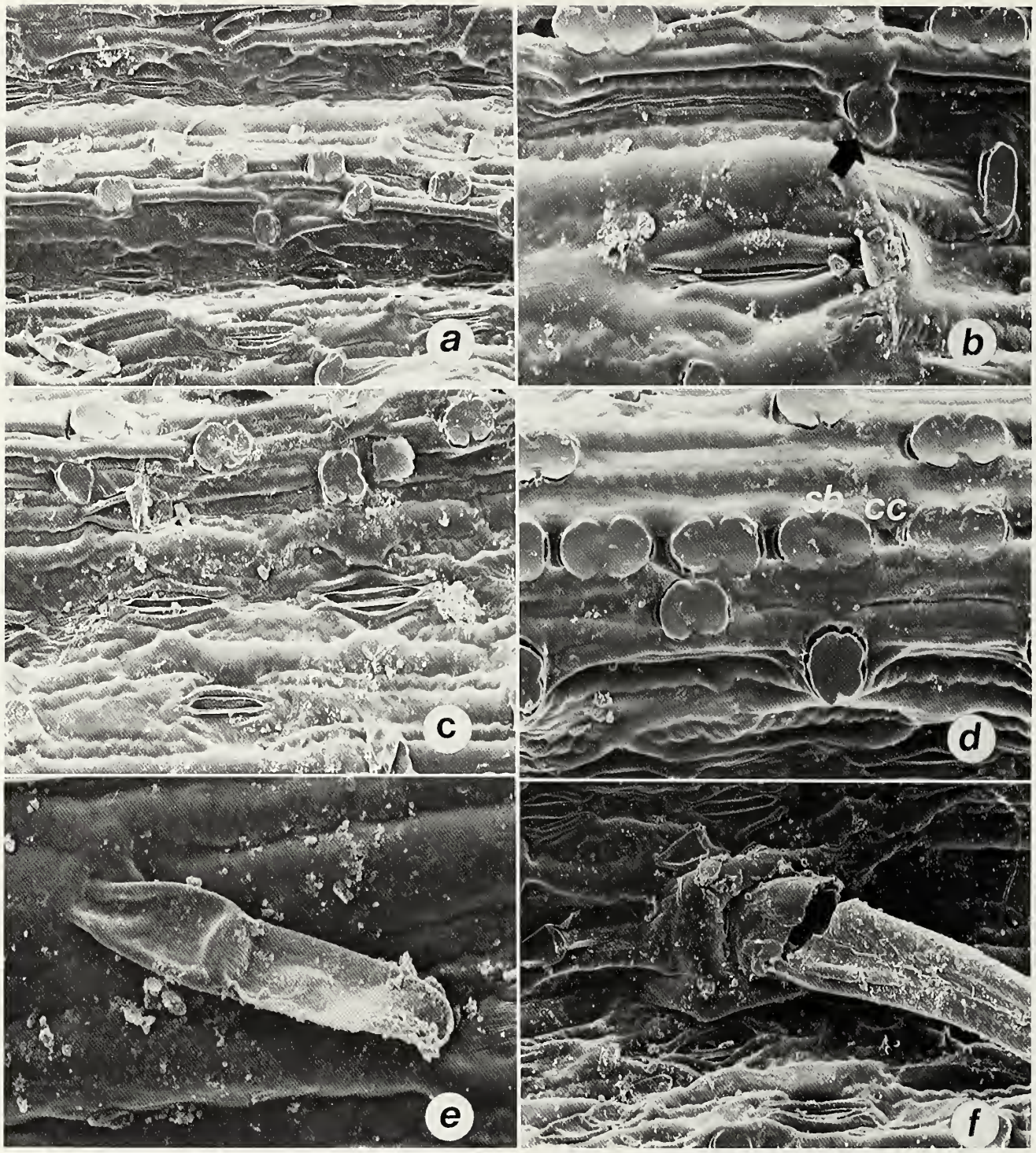

PLATE 83.—Abaxial epidermis *Urelytrum digitatum,* Thomas 1293: *a,* overview, long cells, ×320; *b,* stoma, intercostal silica bodies (arrow), ×640; *c,* interstomatal cells, ×480; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×480.

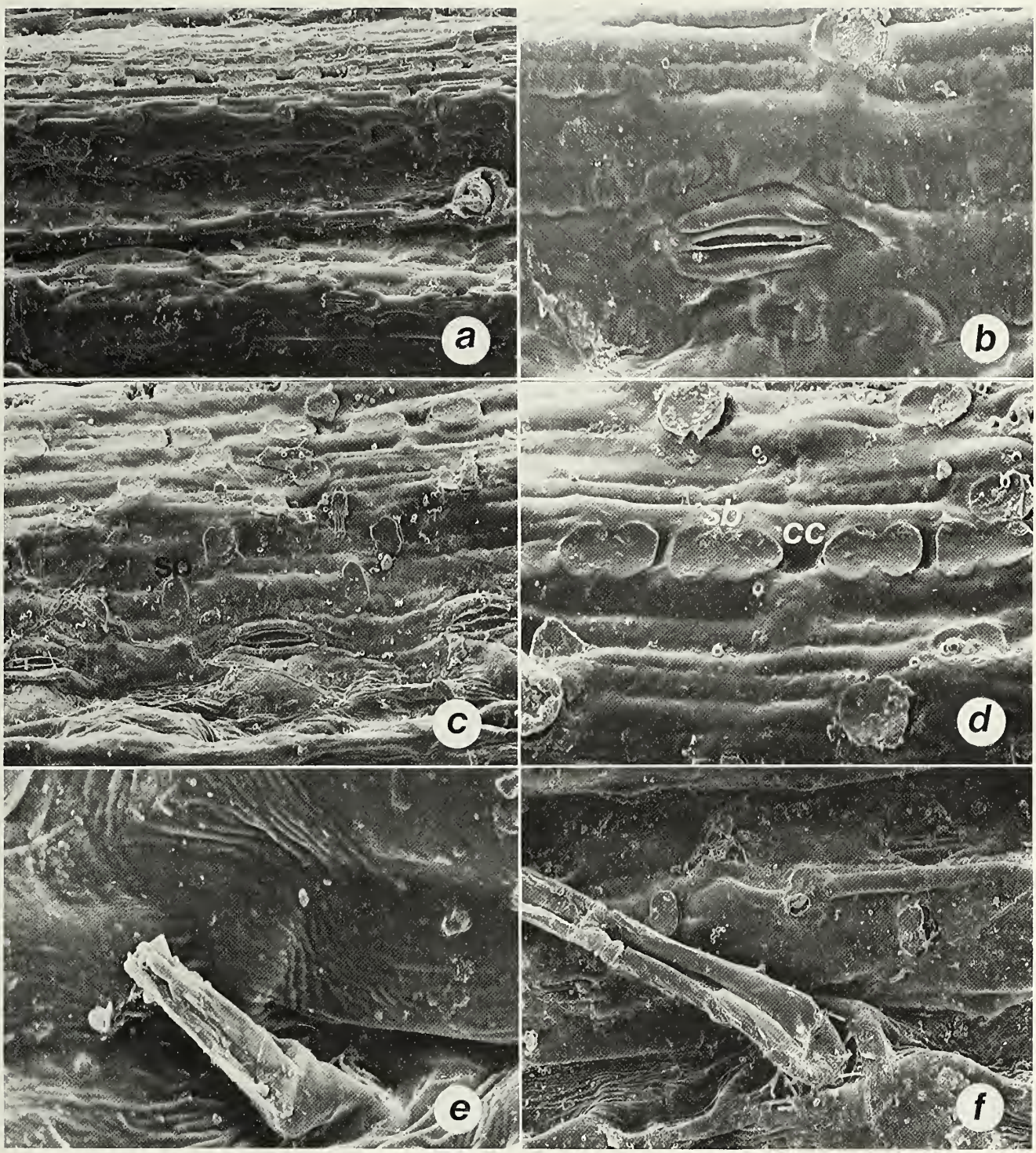

PLATE 84.—Adaxial epidermis *Urelytrum digitatum,* Thomas 1293: *a,* overview, long cells, ×160; *b,* stoma, interstomatal cell, ×640; *c,* interstomatal cells, long cells, intercostal silica bodies (sb), ×320; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* macrohair, ×320.

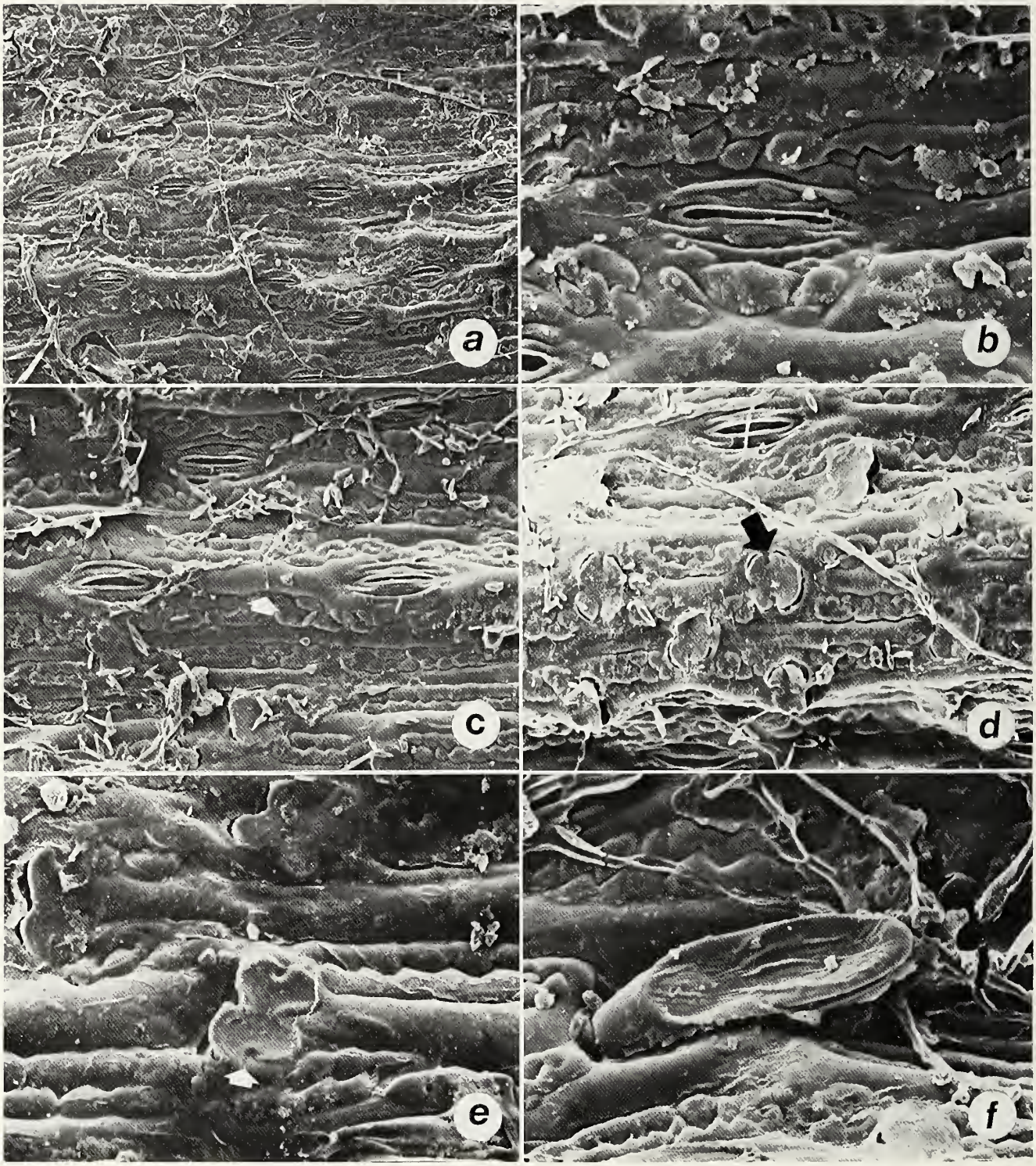

PLATE 85.—Abaxial epidermis *Vetiveria nigritana,* Nicholson 35: *a,* overview, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), ×640; *d,* costal silica bodies (arrow), ×640; *e,* intercostal silica body (arrow), ×1250; *f,* microhair, ×1250.

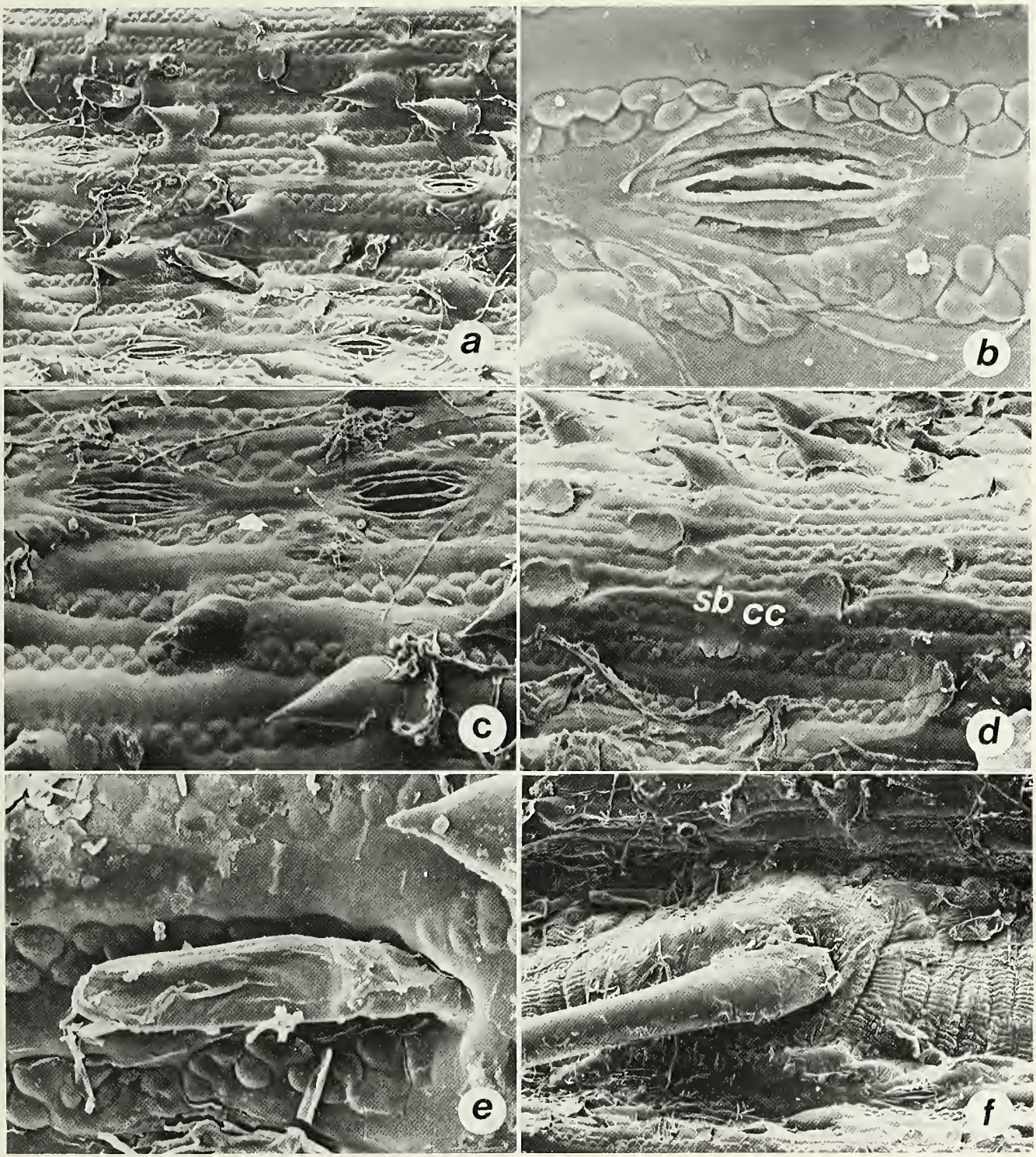

PLATE 86.—Adaxial epidermis *Vetiveria nigritana,* Nicholson 35: *a,* overview, prickles, ×320; *b,* stoma, ×1250; *c,* interstomal cell (arrow), ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

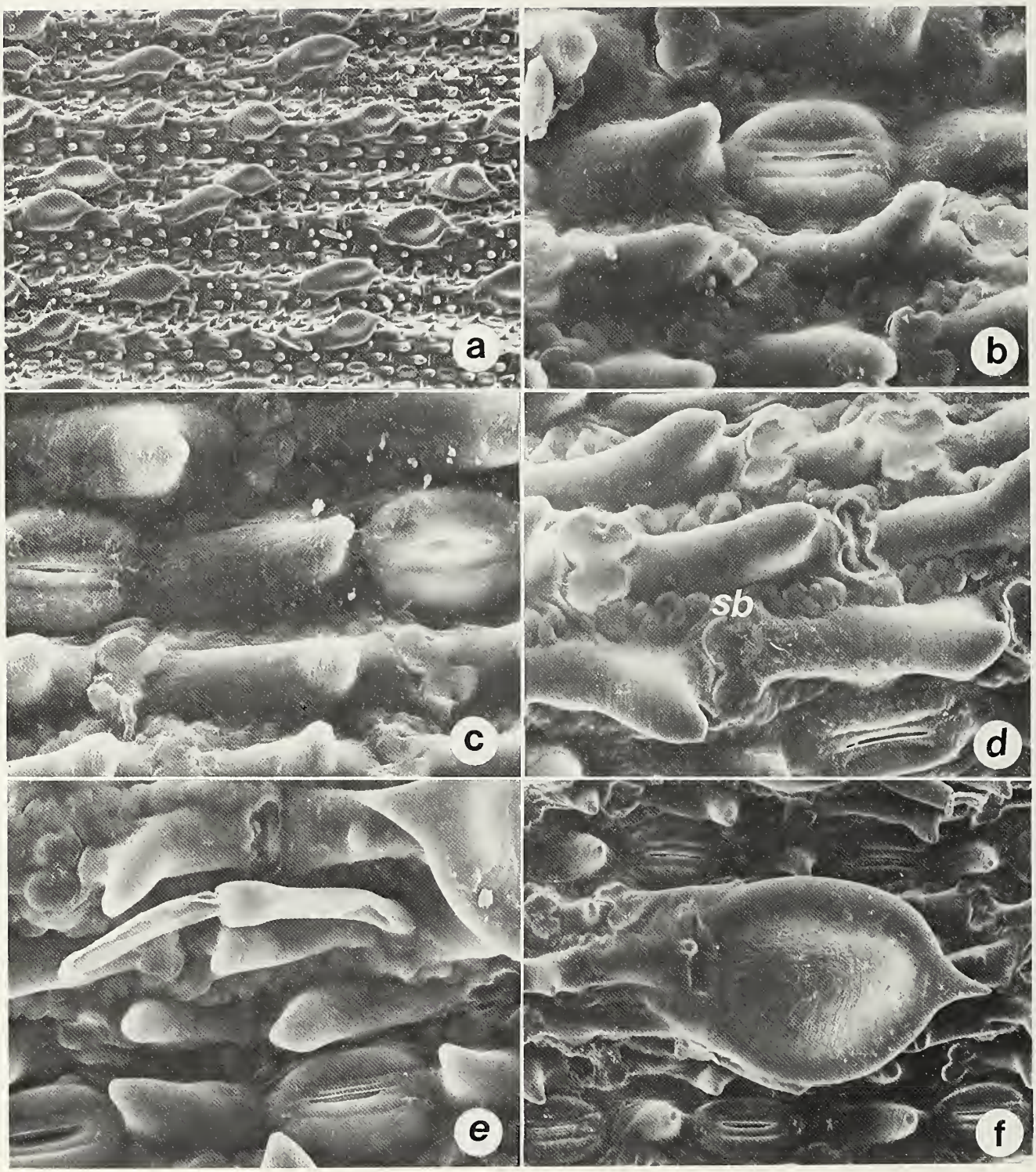

PLATE 87.—Abaxial epidermis *Vossia cuspidata,* Harris 1825: *a,* overview, prickles, ×160; *b,* stoma, long cells, ×1250; *c,* interstomatal cell, ×1250; *d,* intercostal silica bodies (sb), ×1250; *e,* microhair, ×1250; *f,* costal prickle, long cells, ×640.

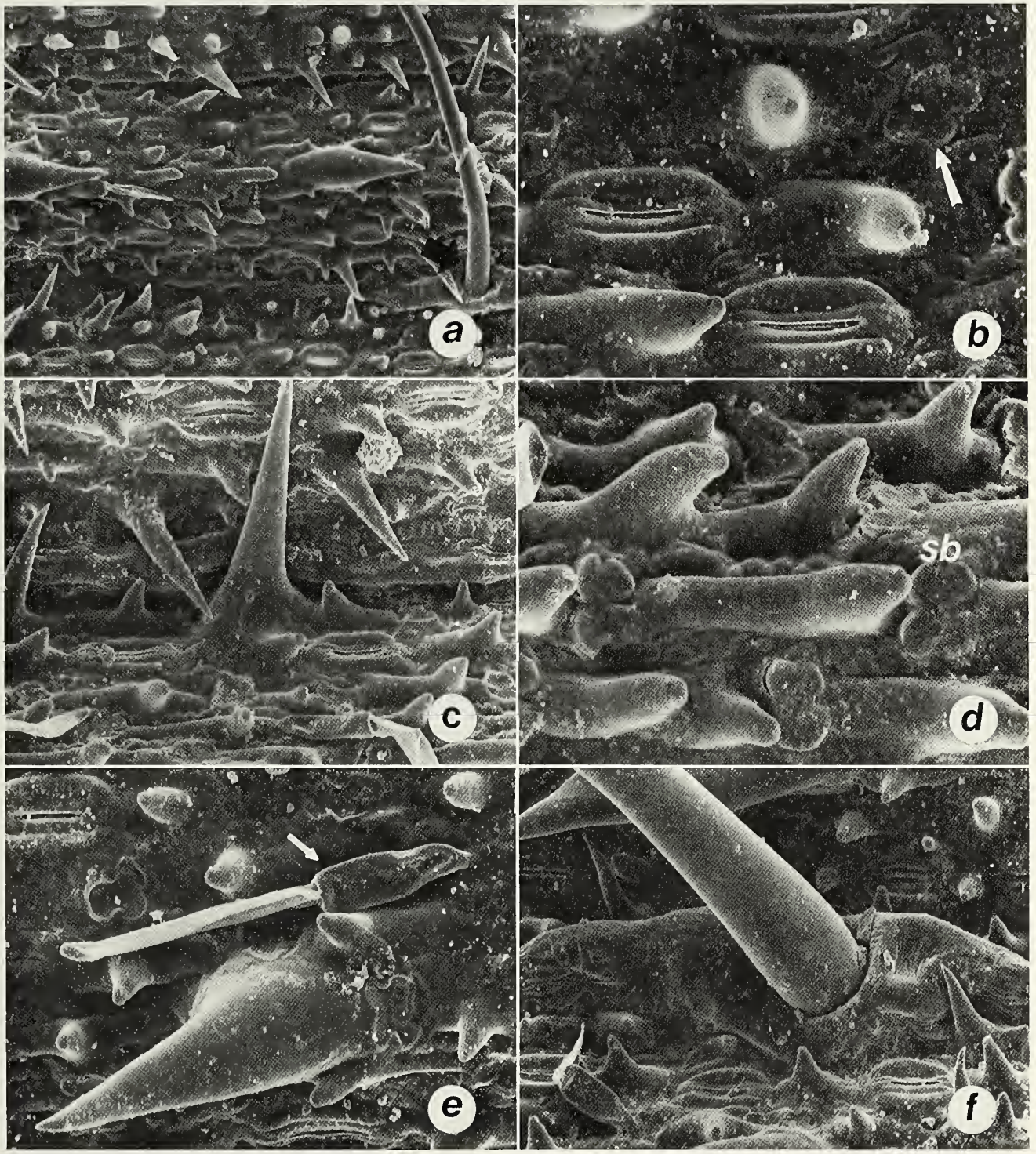

PLATE 88.—Adaxial epidermis *Vossia cuspidata,* Harris 1825: *a,* overview, costal prickles, macrohair (arrow), ×320; *b,* stomata, interstomatal cells, intercostal silica bodies (arrow), ×1250; *c,* short macrohair-type prickles, ×640; *d,* costal silica bodies (sb), long cells, ×1250; *e,* microhair (arrow), prickle, ×960; *f,* base of macrohair, ×640.

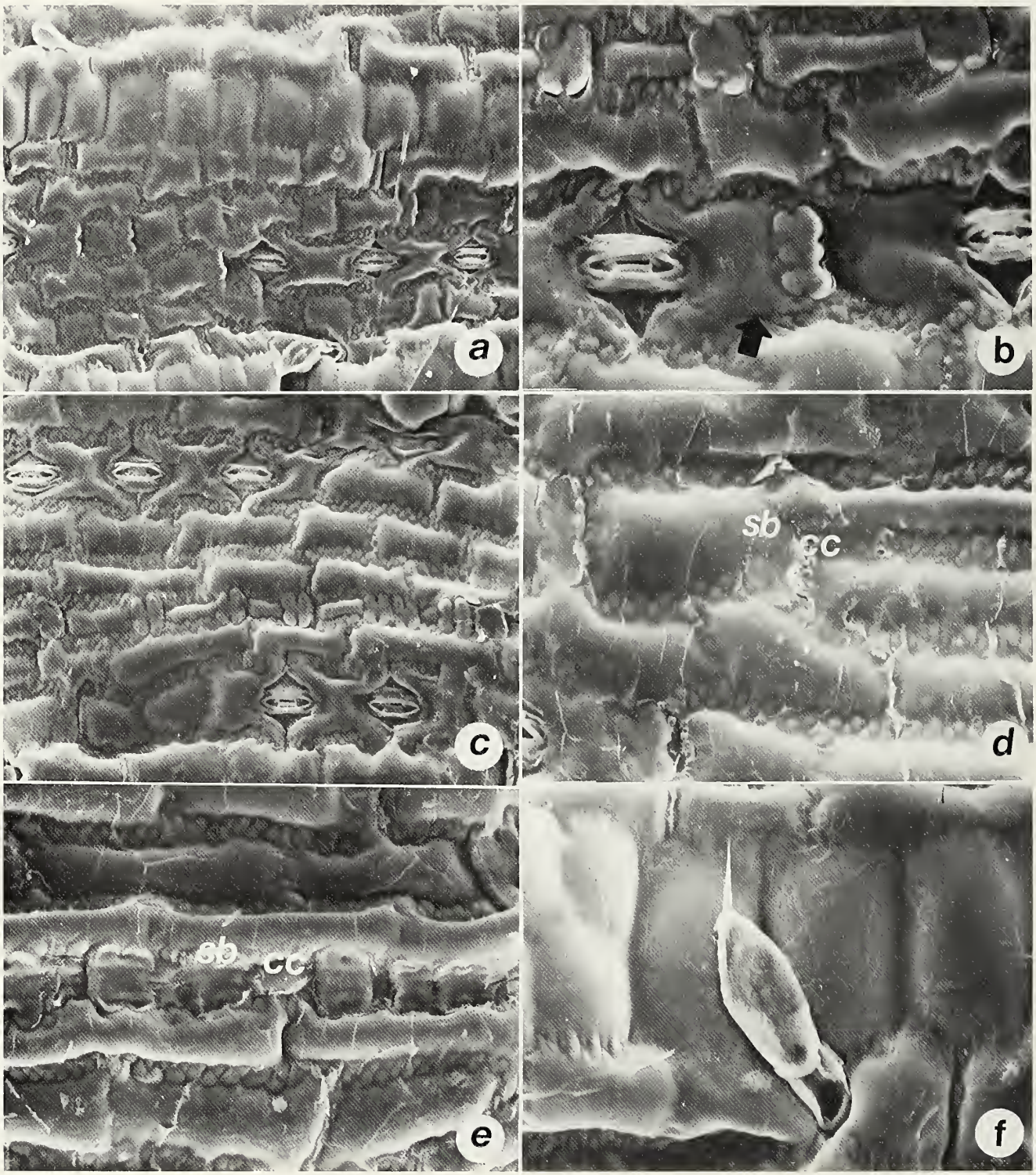

PLATE 89.—Abaxial epidermis *Coix lacryma-jobi*, Harris and Mwasumbi 955: *a*, overview, long cells, ×240; *b*, stomata, interstomatal cells (arrow), ×640; *c*, long cells, interstomatal cells, ×320; *d*, intercostal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×640.

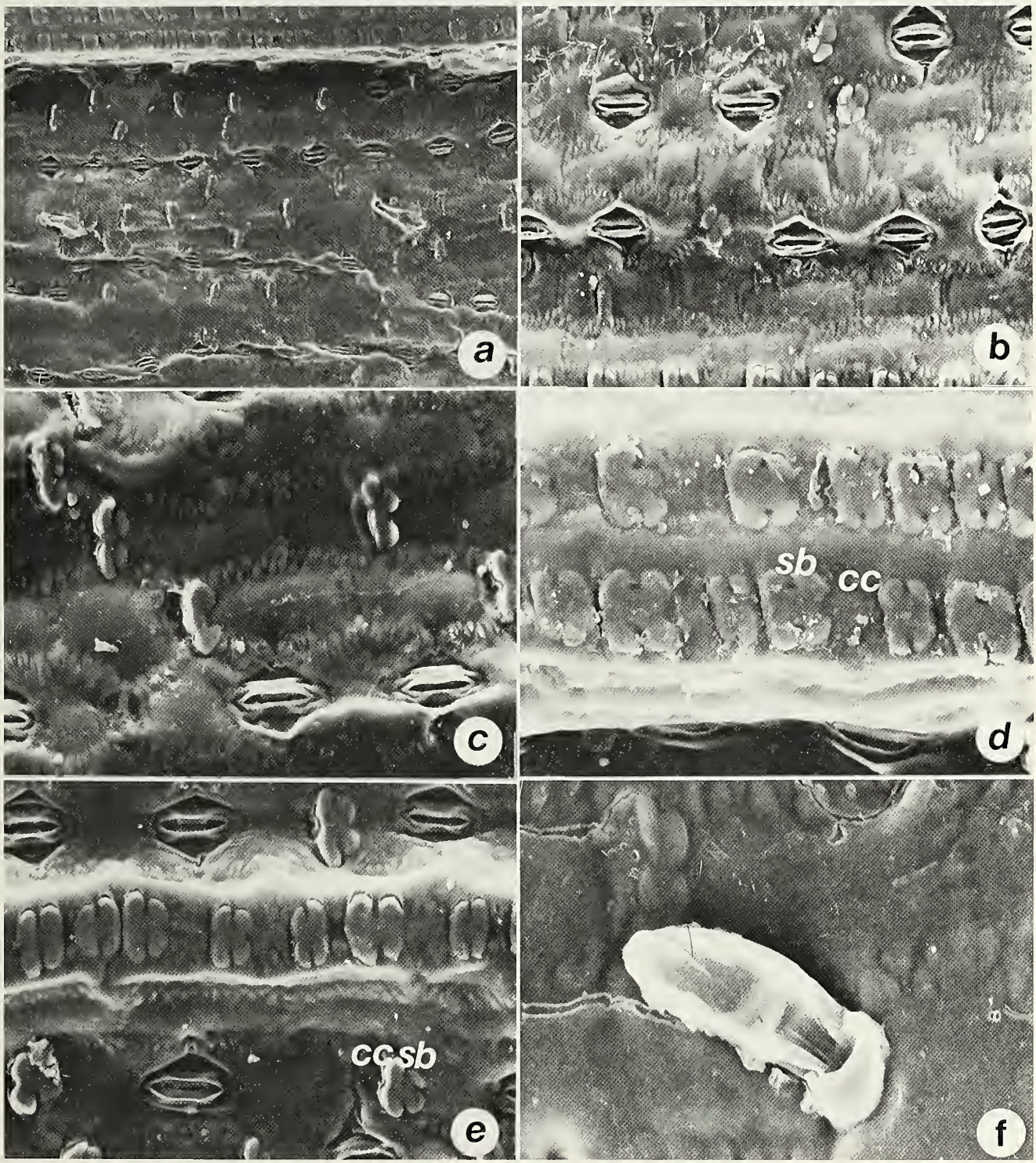

PLATE 90.—Abaxial epidermis *Coix lacryma-jobi*, Harris and Mwasumbi 955: *a*, overview, long cells, ×160; *b*, stomata, interstomatal cells, ×320; *c*, long cells, interstomatal cells, ×480; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, intercostal silica bodies (sb), cork cells (cc), ×480; *f*, microhair, ×1250.

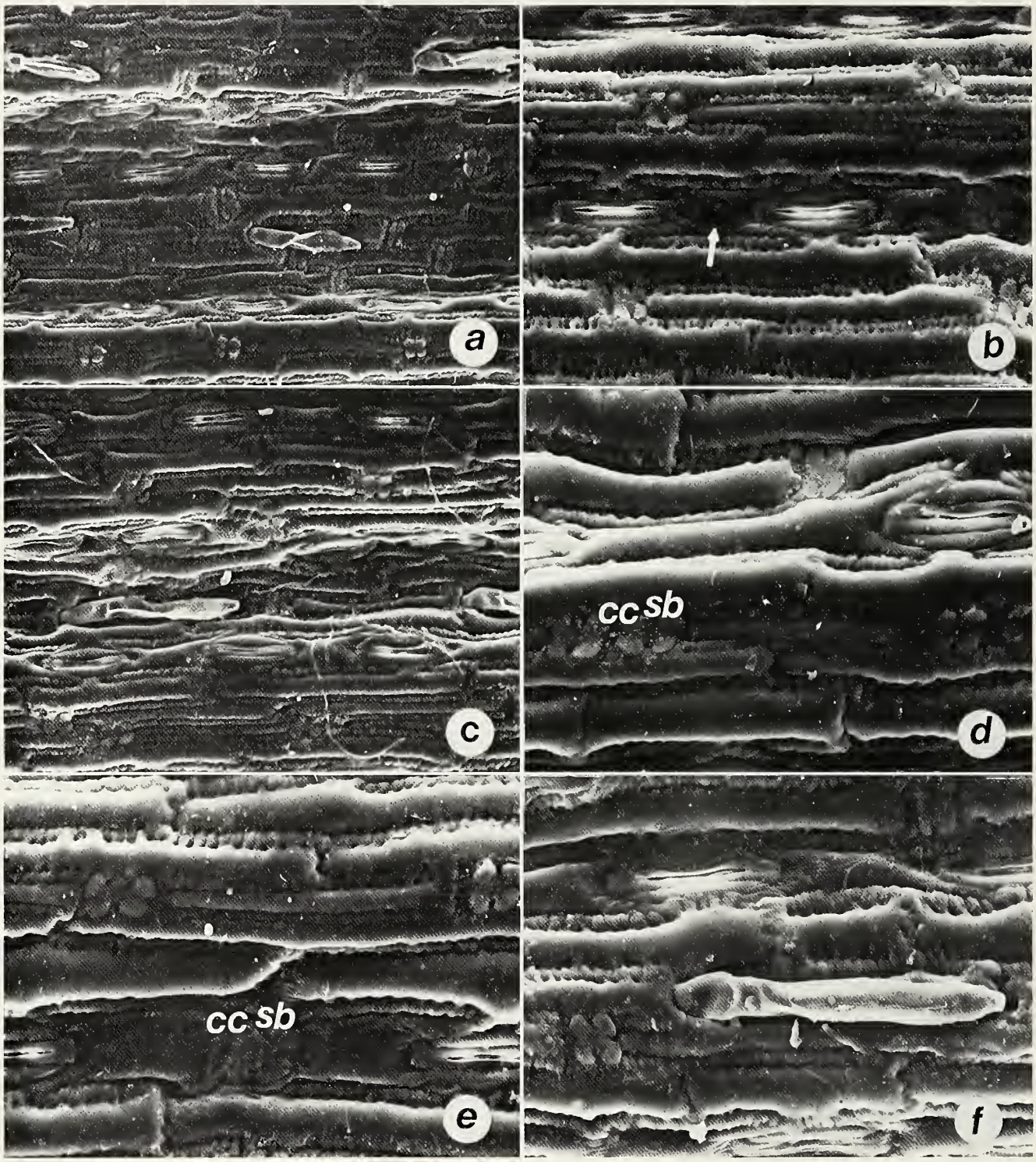

PLATE 91.—Abaxial epidermis *Tripsacum andersonii* Calderón 1332: *a,* overview, long cells, ×240; *b,* stomata, interstomatal cells (arrow), ×480; *c,* long cells, ×352; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal silica bodies (sb), cork cells (cc), ×640; *f,* microhair, ×640.

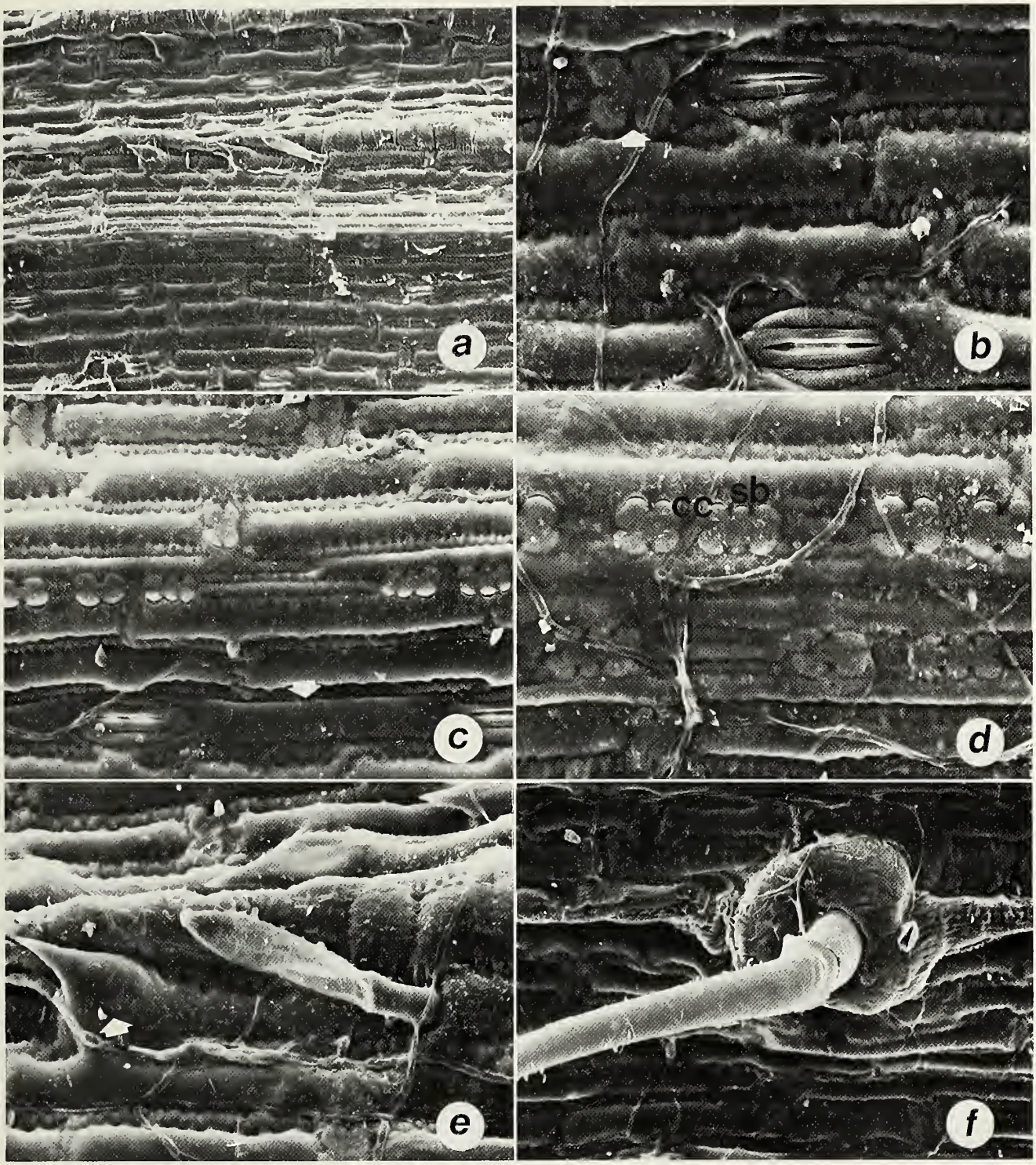

PLATE 92.—Adaxial epidermis *Tripsacum andersonii* Calderón 1332: *a,* overview, long cells, ×160; *b,* stomata, intercostal silica body (arrow), ×640; *c,* interstomatal cell (arrow), long cells, ×480; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* prickles (arrow), microhair, ×640; *f,* base of macrohair, ×320.

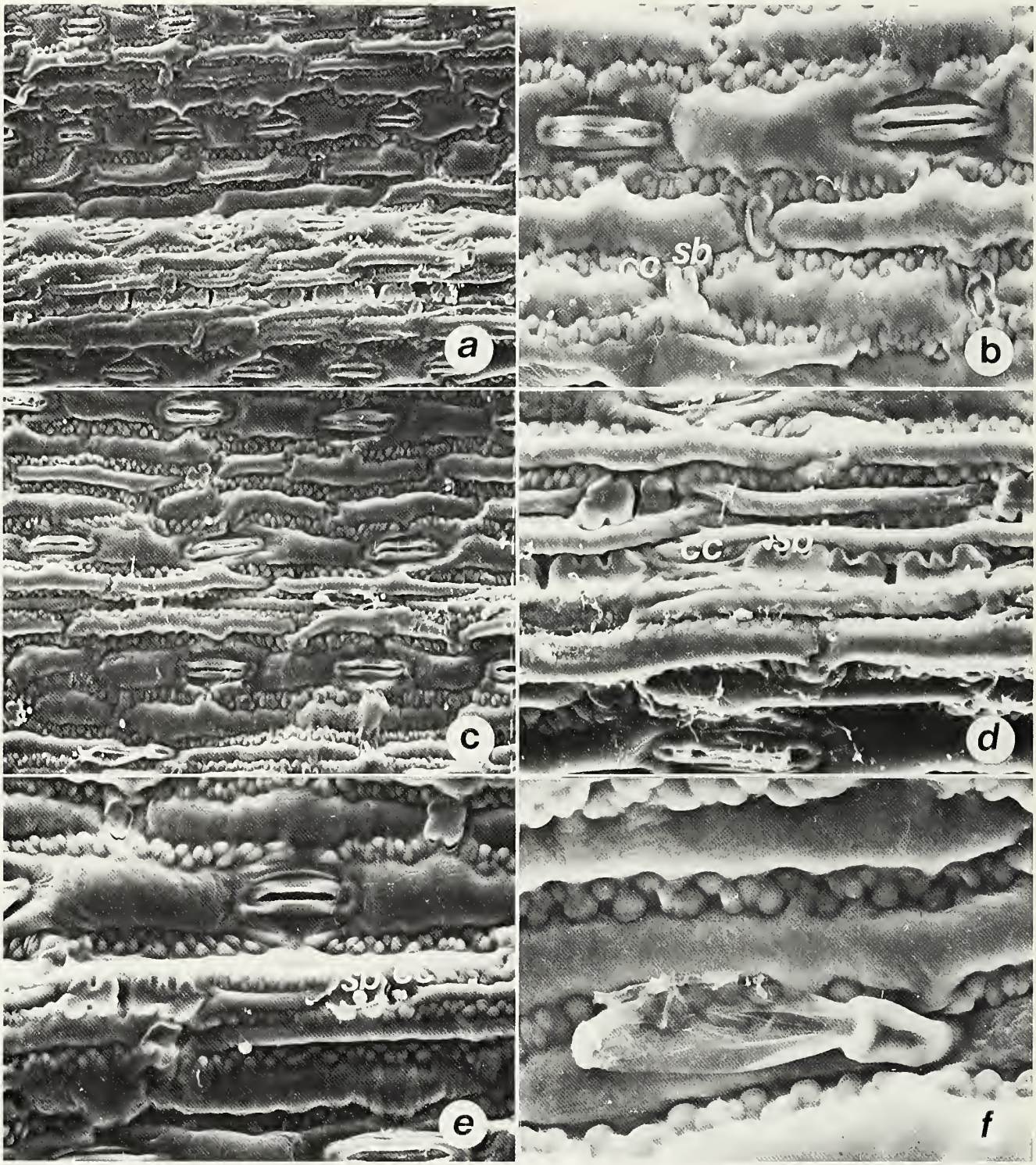

PLATE 93.—Abaxial epidermis *Zea mays*, Asima 421: *a*, overview, long cells, ×240; *b*, stomata, interstomatal cell, intercostal silica bodies (sb), cork cells (cc), ×640; *c*, long cells, interstomatal cells, ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×1250.

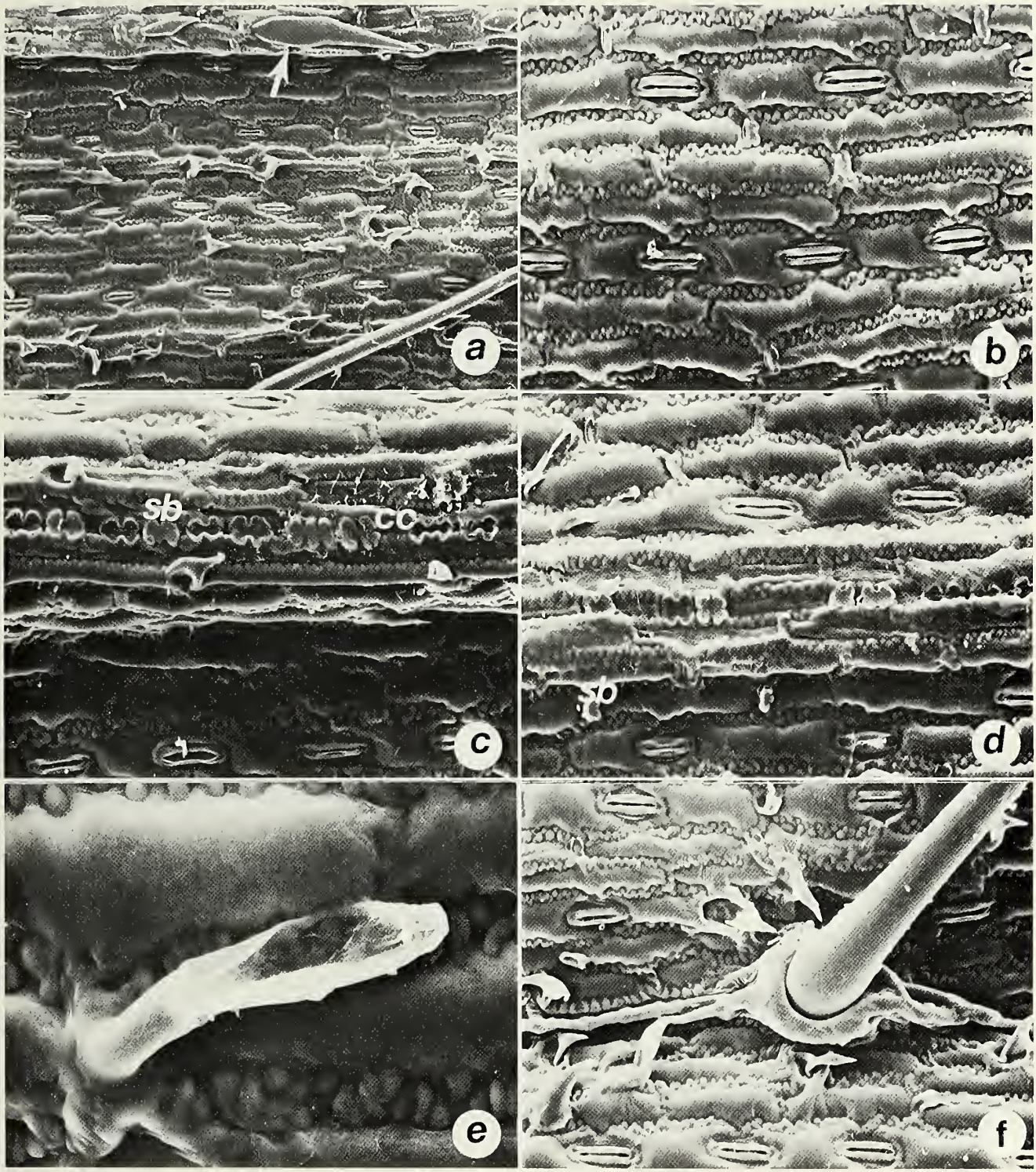

PLATE 94.—Adaxial epidermis *Zea mays*, Asima 421: *a*, overview, short macrohair-type prickle (arrow), prickles, ×160; *b*, interstomatal cells, long cells, ×320; *c*, costal silica bodies (sb), cork cells (cc), ×320; *d*, interstomatal cells, intercostal silica bodies (sb), ×320; *e*, microhair, ×1250; *f*, base of macrohair, ×320.

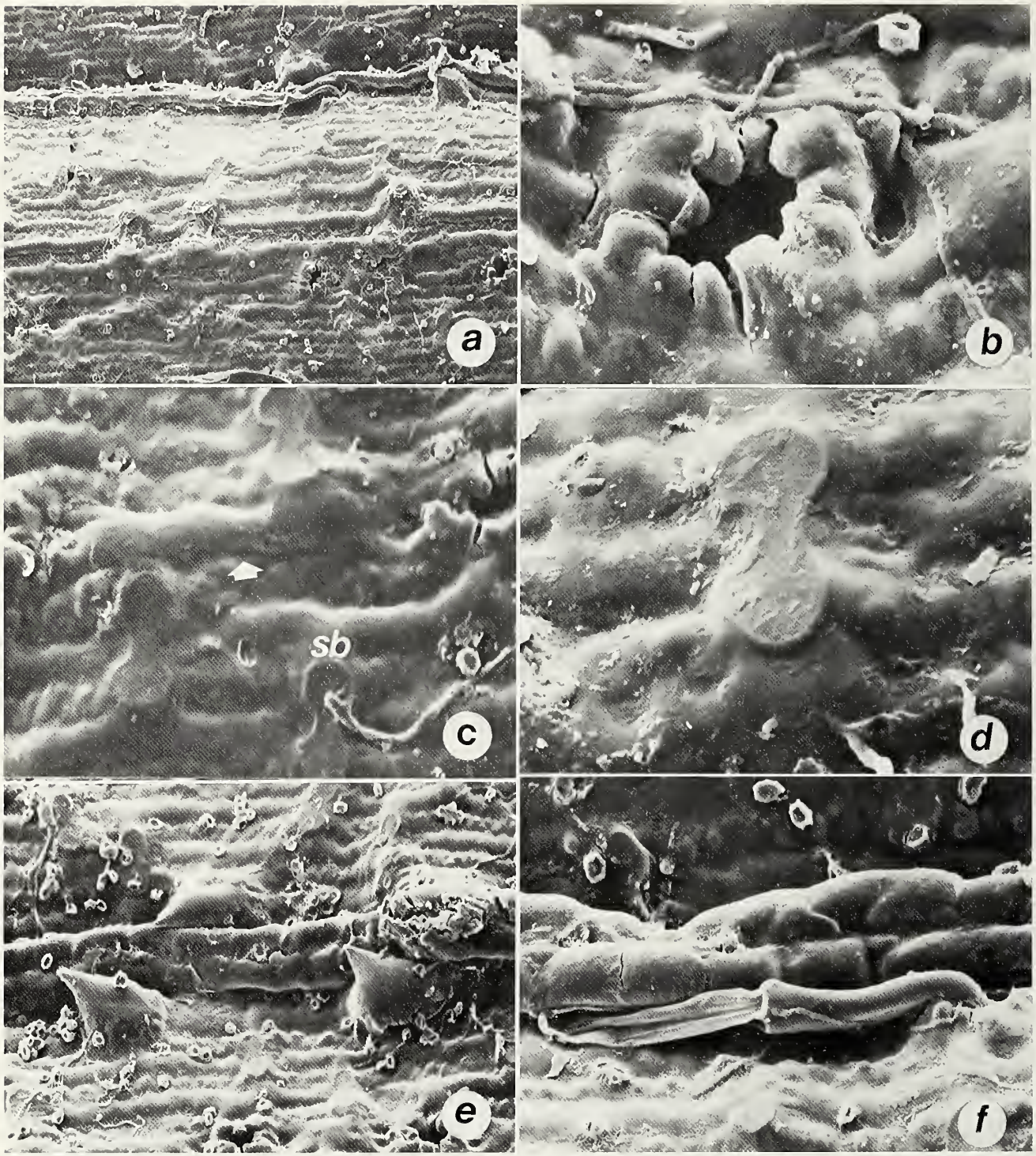

PLATE 95.—Abaxial epidermis *Bambusa vulgaris*, Palmer 895: *a*, overview, long cells, ×320; *b*, stoma, ×2500; *c*, interstomatal cell (arrow), intercostal silica bodies (sb), ×1250; *d*, intercostal silica body, ×2500; *e*, intercostal prickles, ×640; *f*, microhair, ×1250.

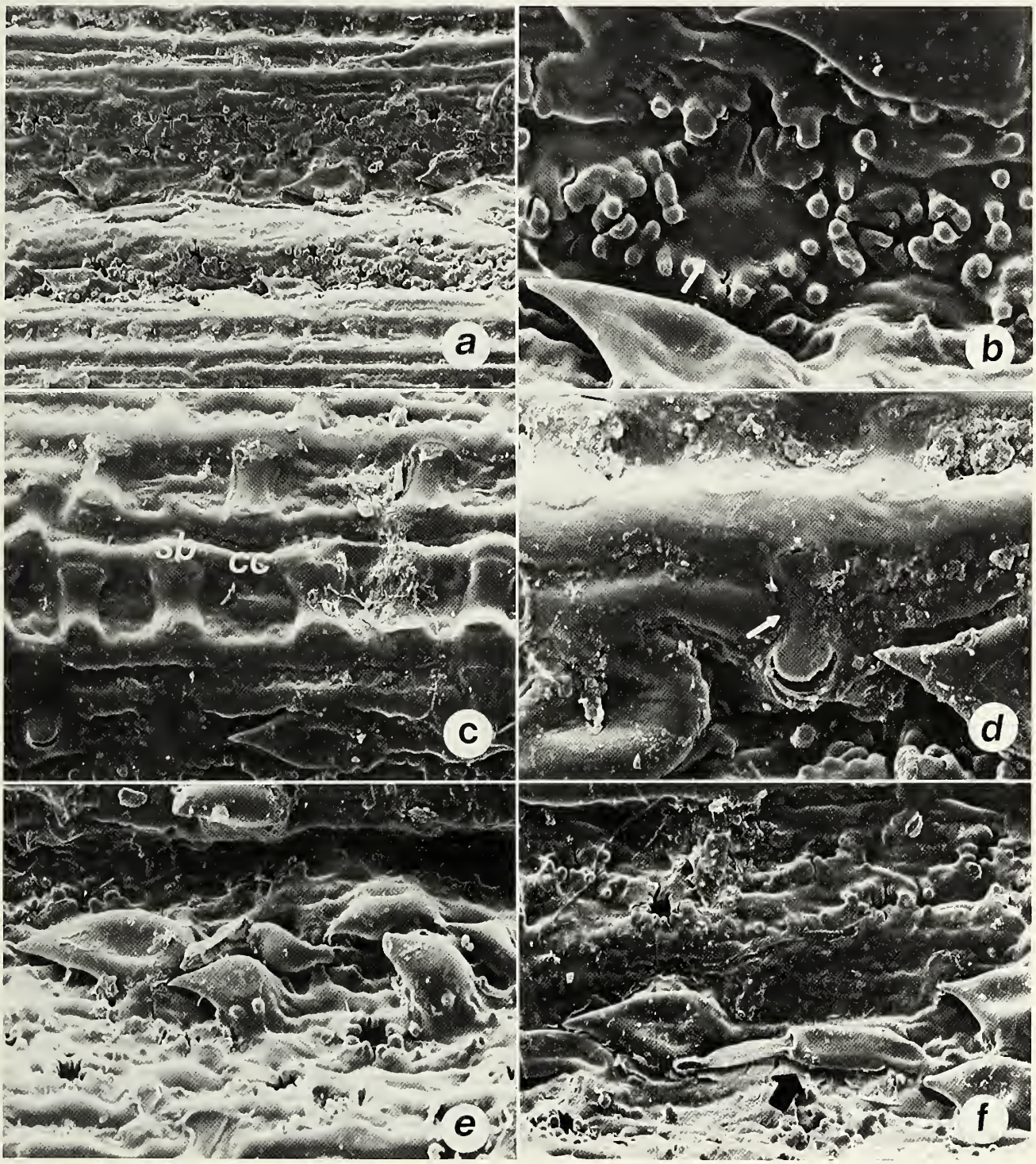

PLATE 96.—Adaxial epidermis *Bambusa vulgaris,* Palmer 895: *a,* overview, long cells, ×320; *b,* stomata, interstomatal cell (arrow), ×1250; *c,* costal silica bodies (sb), cork cells (cc), ×640; *d,* intercostal silica body (arrow), ×1250; *e,* intercostal prickles, ×640; *f,* microhair (arrow), ×640.

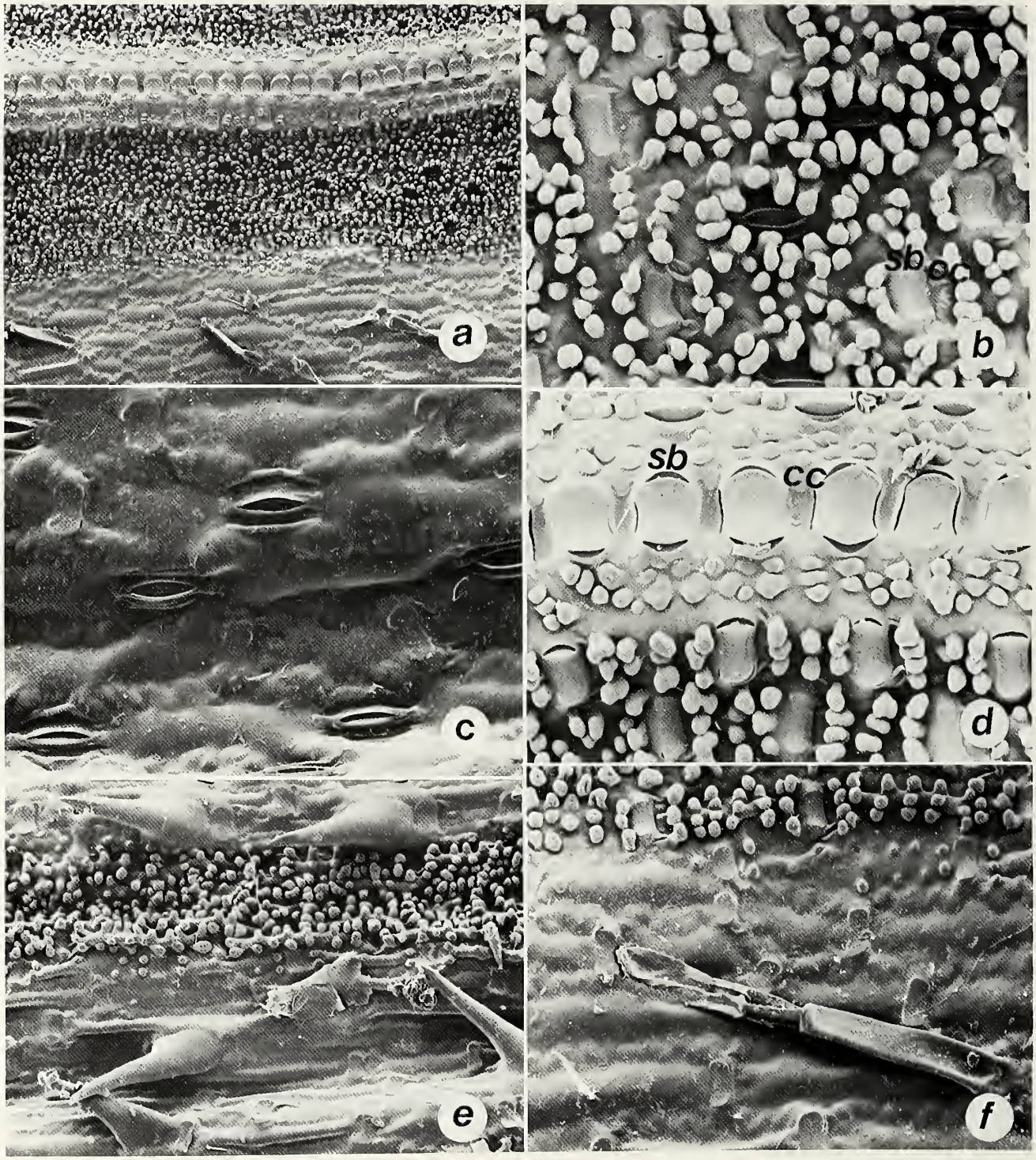

PLATE 97.—Abaxial epidermis *Guaduella oblonga,* Baldwin 6704: *a,* overview, long cells, ×160; *b,* stomata, interstomatal cells, intercostal silica bodies (sb), cork cells (cc), ×640; *c,* stomata, interstomatal cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* intercostal prickles, ×320; *f,* microhair, ×480.

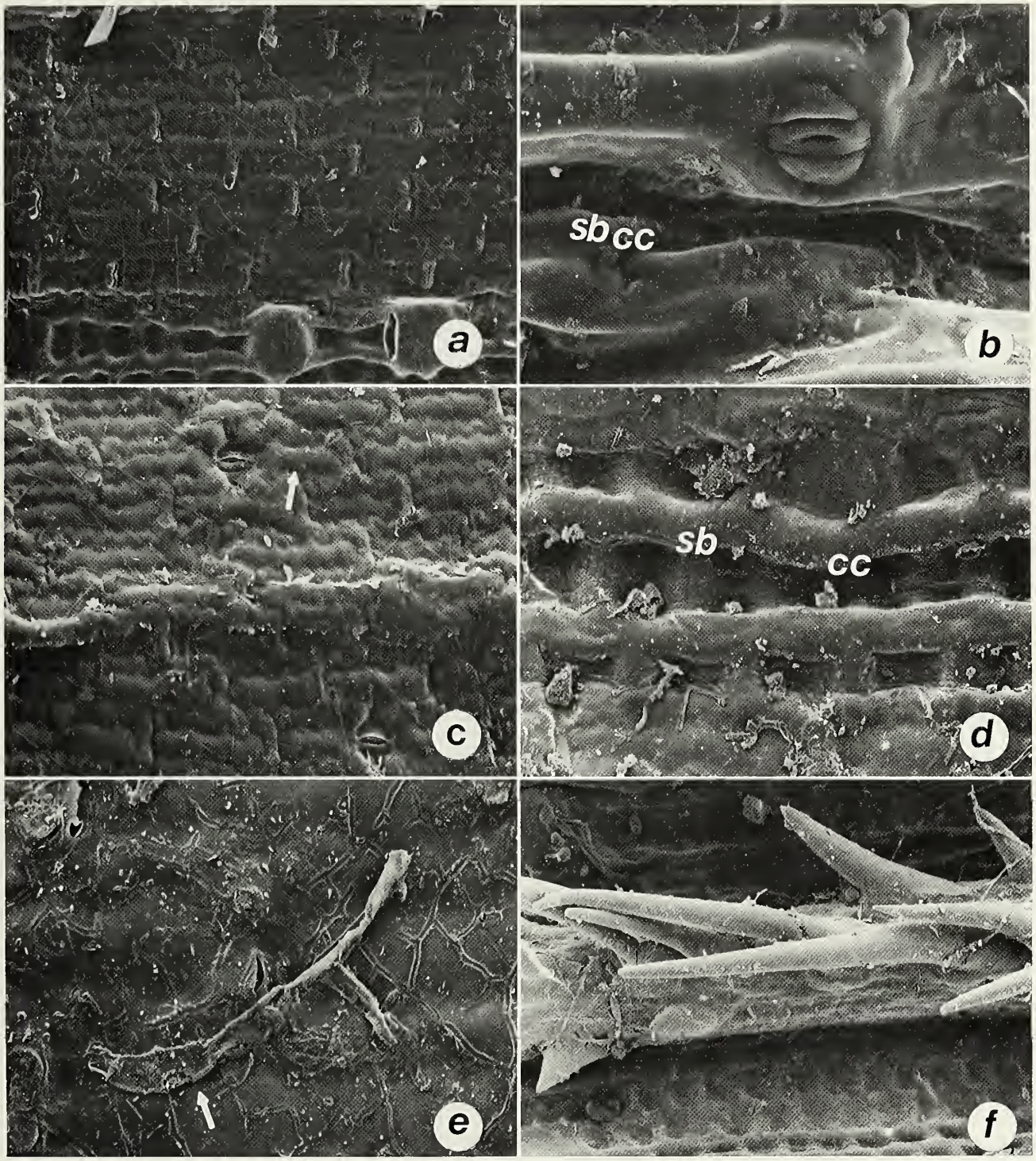

PLATE 98.—Adaxial epidermis *Guaduella oblonga*, Baldwin 6704: *a*, overview, long cells, ×240; *b*, stoma, intercostal silica bodies (sb), cork cell (cc), ×640; *c*, long cells, interstomatal cells (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, microhair (arrow), ×960; *f*, prickles, ×240.

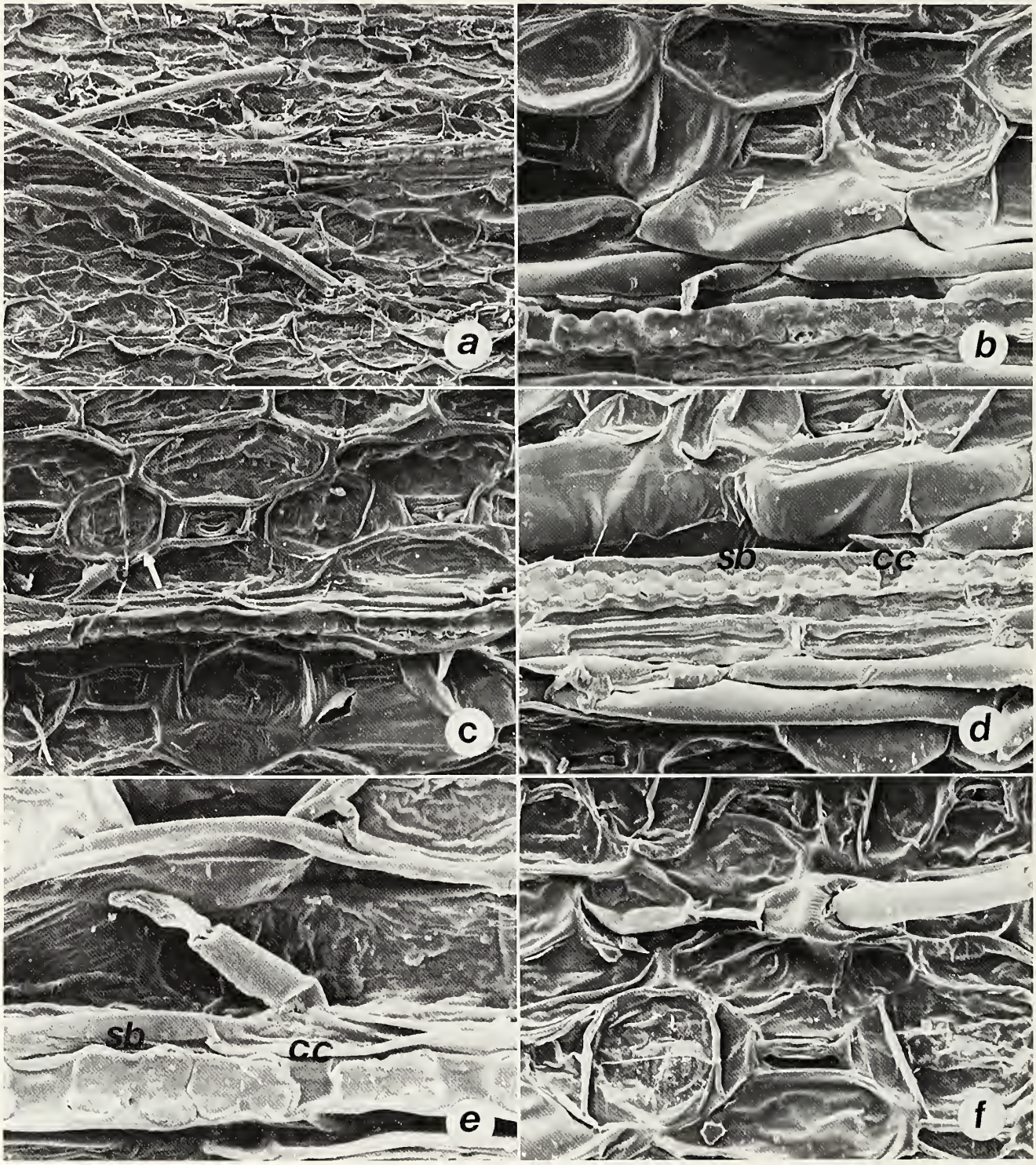

PLATE 99.—Abaxial epidermis *Hypseochloa cameroonensis,* Maitland 874: *a,* overview, long cells, ×240; *b,* stoma (arrow), ×640; *c,* interstomatal cells (arrow), prickles, ×480; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, costal silica bodies (sb), cork cells (cc), ×1250; *f,* base of macrohair, ×640.

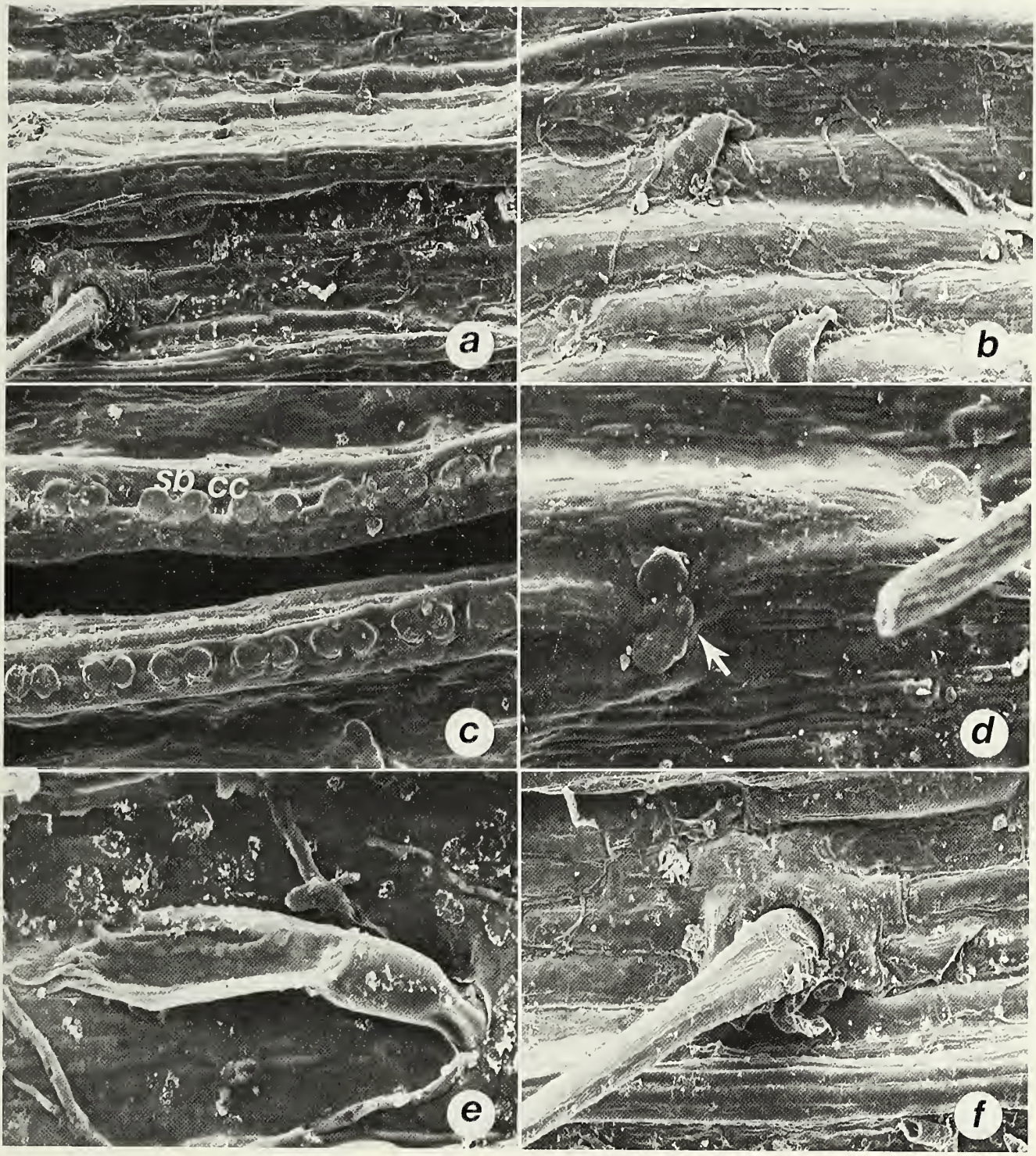

PLATE 100.—Adaxial epidermis *Hypseochloa cameroonensis*, Maitland 874: *a*, overview, long cells, ×240; *b*, long cells, prickles, ×640; *c*, costal silica bodies (sb), cork cells (cc), ×640; *d*, intercostal silica bodies (arrow), ×1250; *e*, microhair, ×1875; *f*, base of macrohair, ×480.

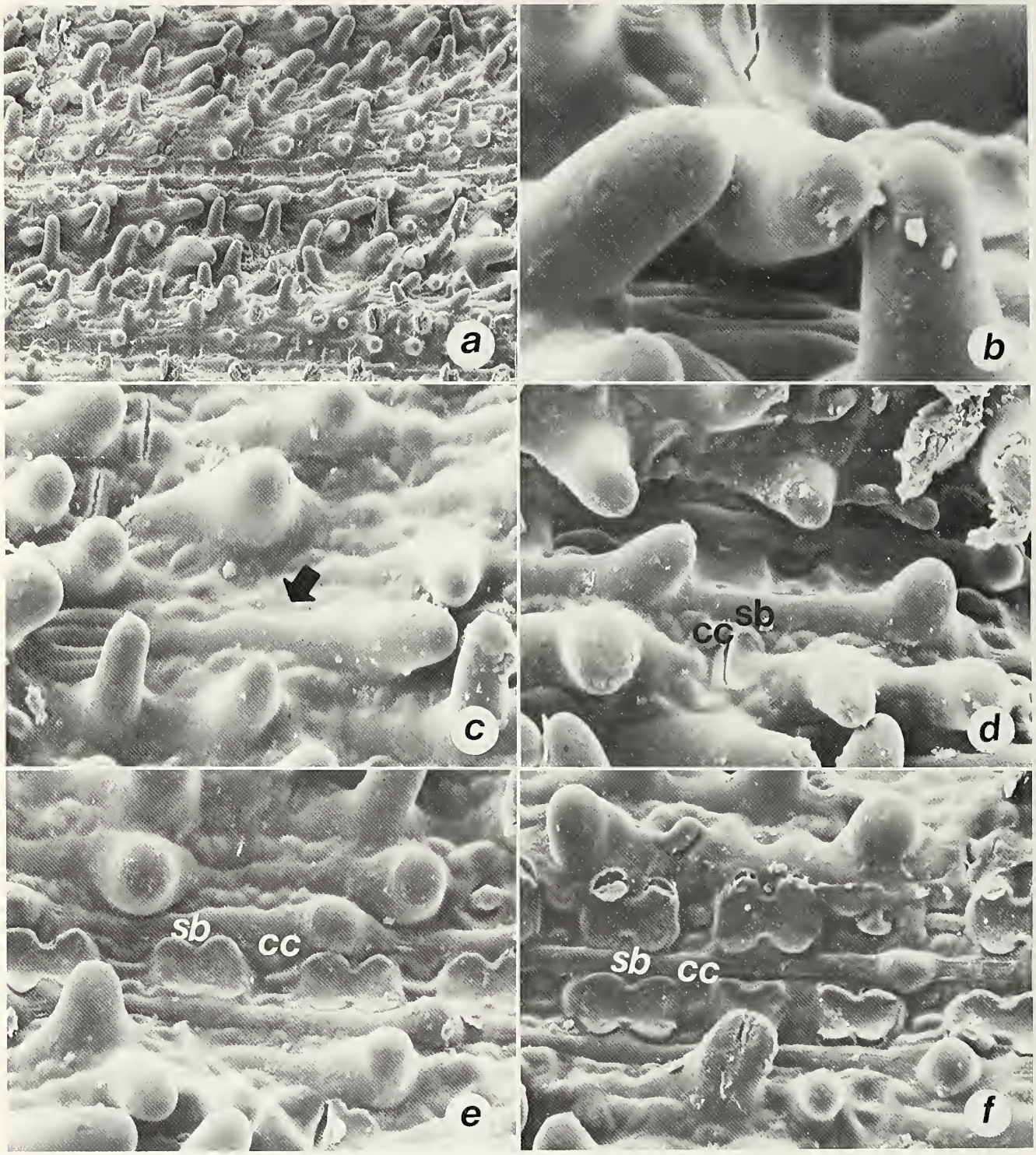

PLATE 101.—Abaxial epidermis *Aeluropus lagopoides*, Arvidsson 61: *a*, overview, long cells, ×320; *b*, stoma, ×2500; *c*, interstomatal cell (arrow), long cells, ×1250; *d*, intercostal silica bodies (sb), cork cells (cc), ×1250; *e*, costal silica bodies (sb), cork cells (cc), ×1250; *f*, costal silica bodies (sb), cork cells (cc), ×1250.

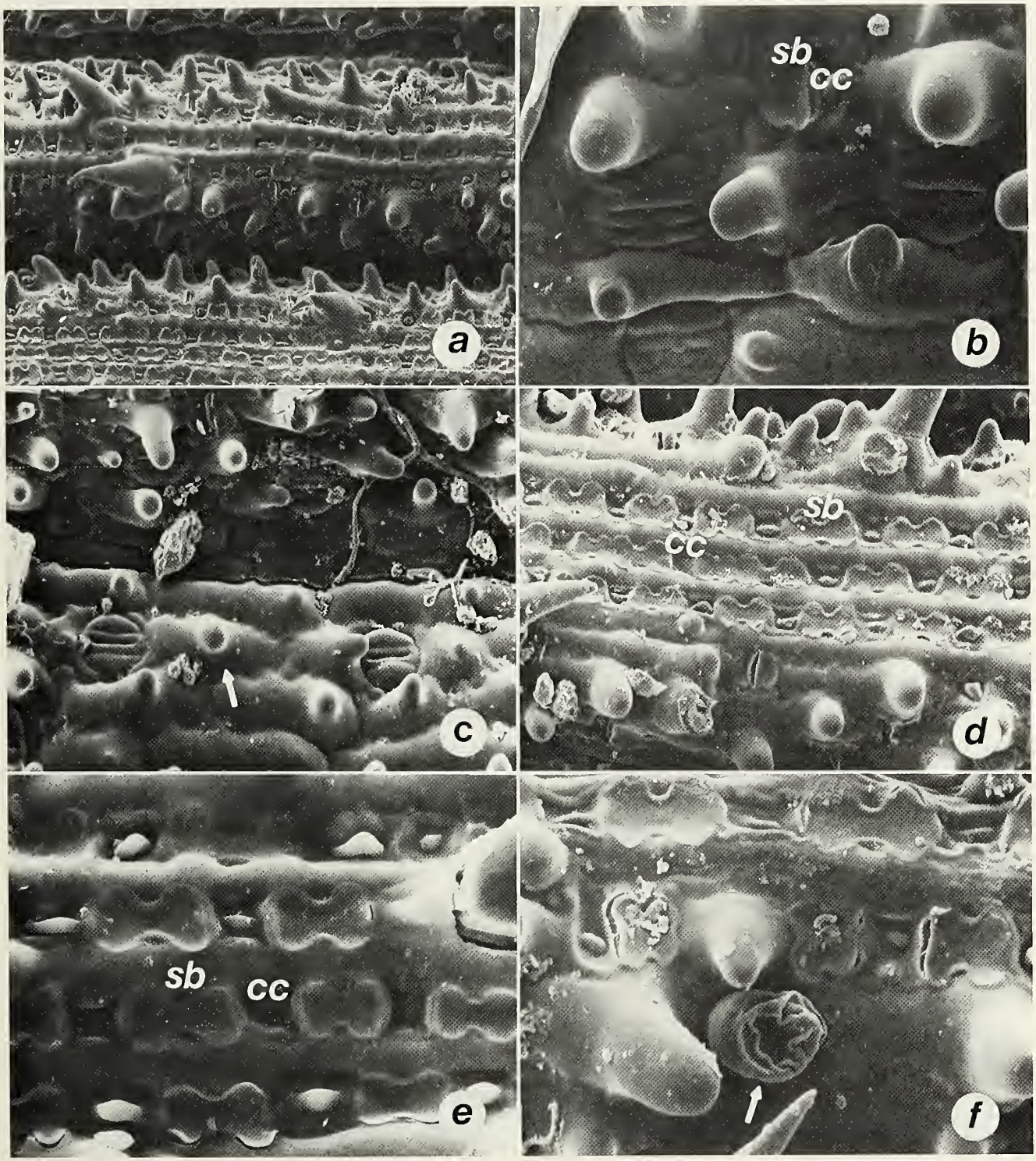

PLATE 102.—Adaxial epidermis *Aeluropus lagopoides*, Arvidsson 61: *a*, overview, long cells, prickles, ×320; *b*, stomata, intercostal silica body (sb), cork cell (cc), ×1250; *c*, interstomatal cells (arrow), long cells, ×640; *d*, costal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×1250; *f*, microhair (arrow), ×1250.
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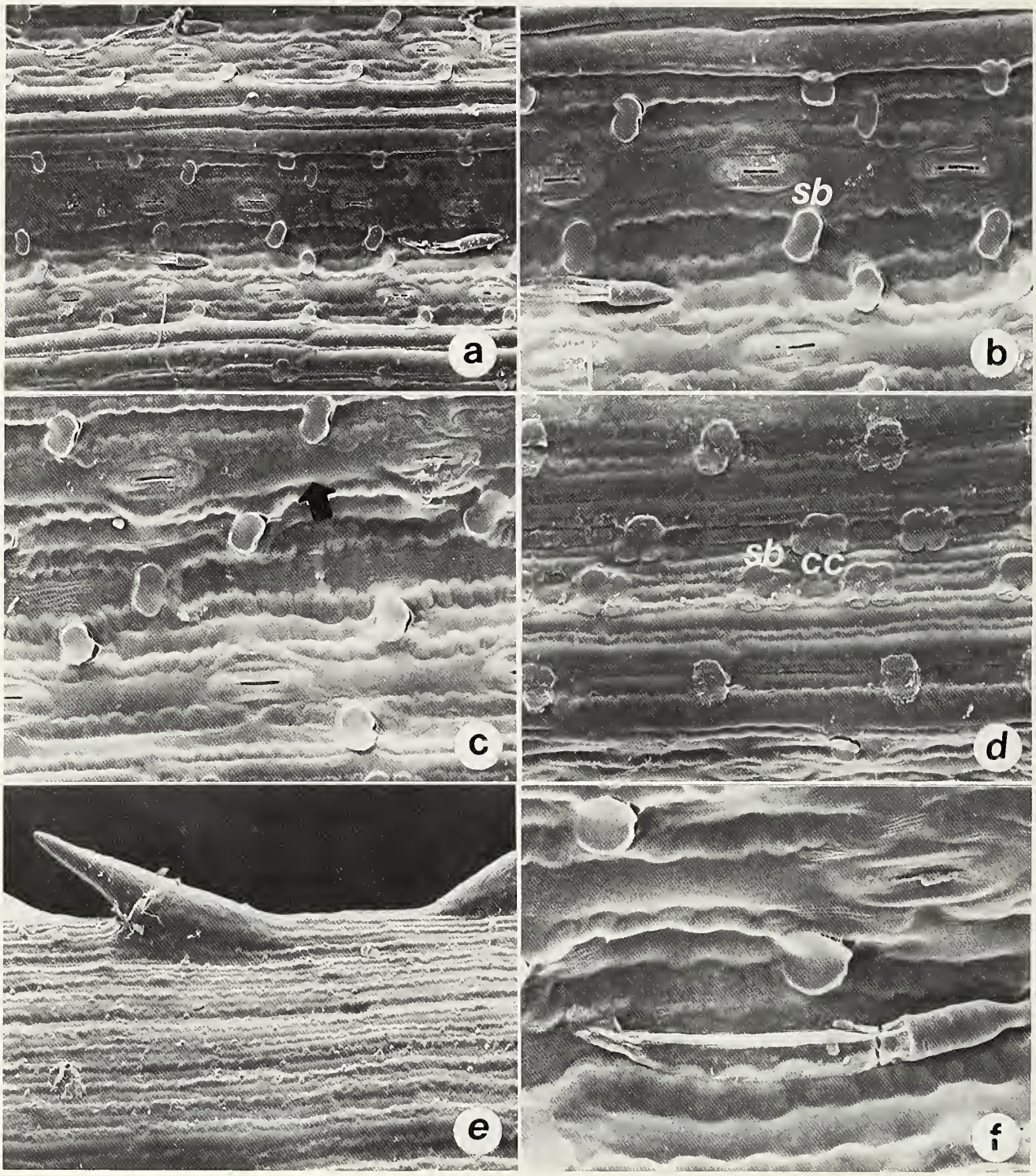

PLATE 103.—Abaxial epidermis *Danthoniopsis chevalieri,* Glanville, 313: *a,* overview, interstomatal cells, ×320; *b,* stomata, long cells, intercostal silica bodies (sb), ×640; *c,* interstomatal cells (arrow), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* marginal prickles, ×320; *f,* microhair, ×1250.

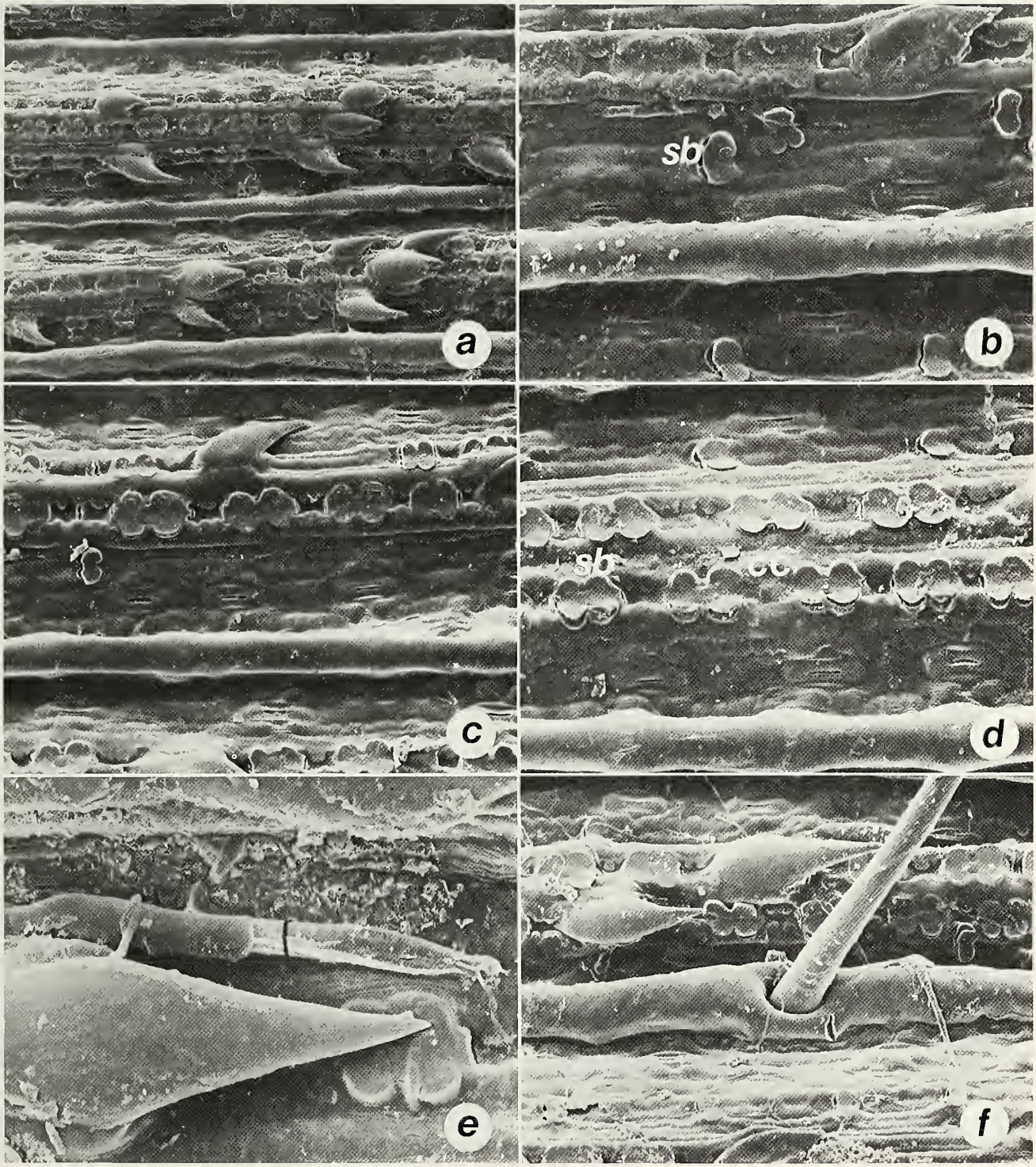

PLATE 104.—Adaxial epidermis *Danthoniopsis chevalieri,* Glanville, 313: *a,* overview, prickles, ×240; *b,* stomata, intercostal silica bodies (sb), ×640; *c,* interstomatal cells, long cells, midintercostal ridge, ×480; *d,* costal silica bodies (sb), cork cells (cc), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×480.

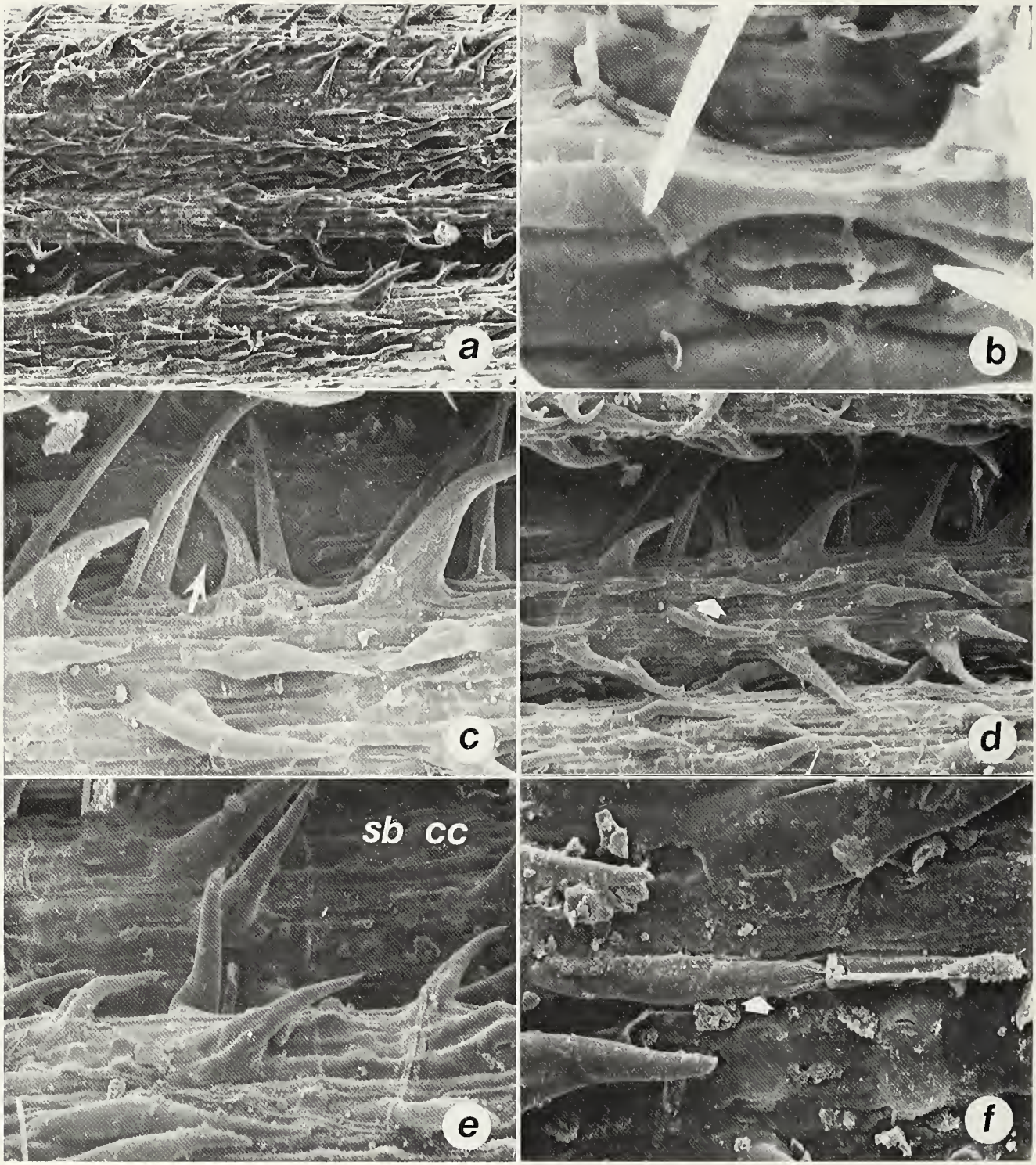

PLATE 105.—Abaxial epidermis *Loudetiopsis thoroldii,* Ankah *s. n.* 30/IX/57: *a,* overview, short macrohairs, ×160; *b,* stoma, ×1375; *c,* interstomatal cell (arrow), long cells, ×640; *d,* costal prickles (arrow), costal zones and intercostal grooves, ×320; *e,* costal silica bodies (sb), cork cells (cc), ×640; *f,* microhair (arrow), ×1250.

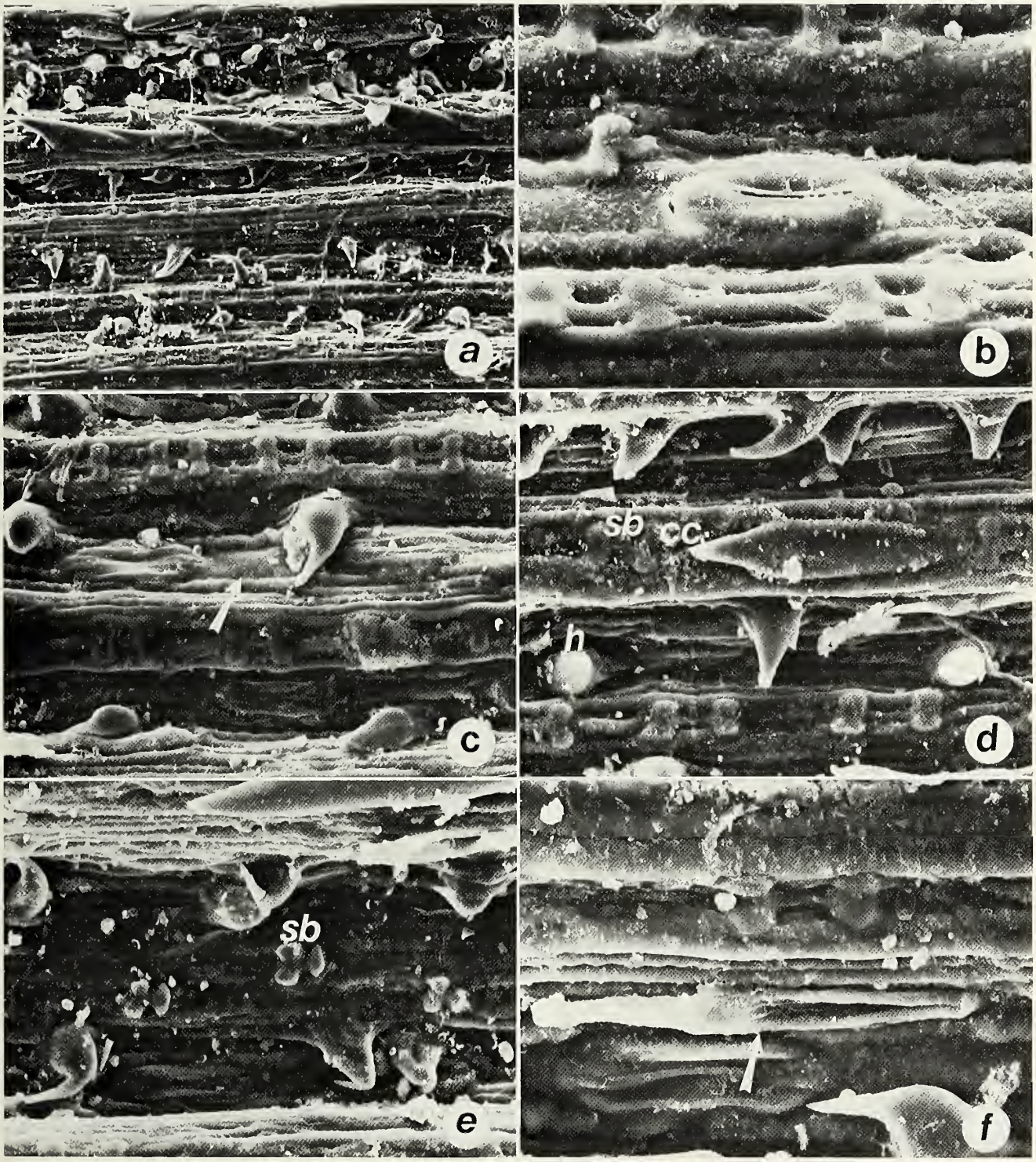

PLATE 106.—Adaxial epidermis *Loudetiopsis thoroldii,* Ankah *s. n.* 30/IX/57: *a,* overview, long cells, ×240; *b,* stoma, ×1250; *c,* interstomatal cells (arrow), long cells, ×640; *d,* costal and intercostal prickles, intercostal hook (h), costal silica bodies (sb), cork cells (cc), ×704; *e,* intercostal silica bodies (sb), ×704; *f,* microhair (arrow), ×1375.

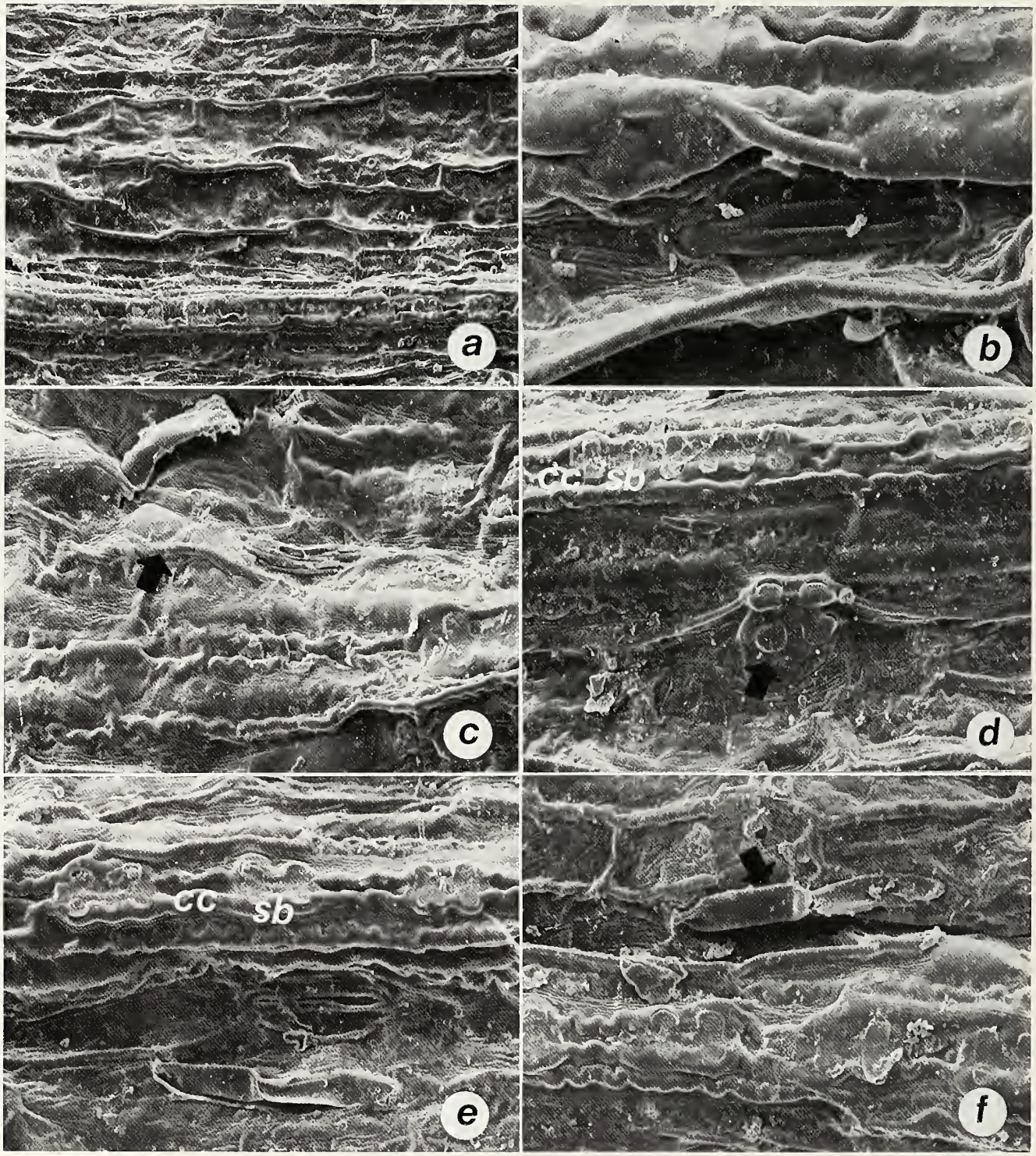

PLATE 107.—Abaxial epidermis *Ichnanthus vicinus,* Adams 807: *a,* overview, long cells, ×240; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), long cells, ×640; *d,* intercostal silica body (arrow), costal silica bodies (sb), cork cells (cc), ×640; *e,* costal silica bodies (sb), cork cells (cc), ×640; *f,* microhair (arrow), ×640.

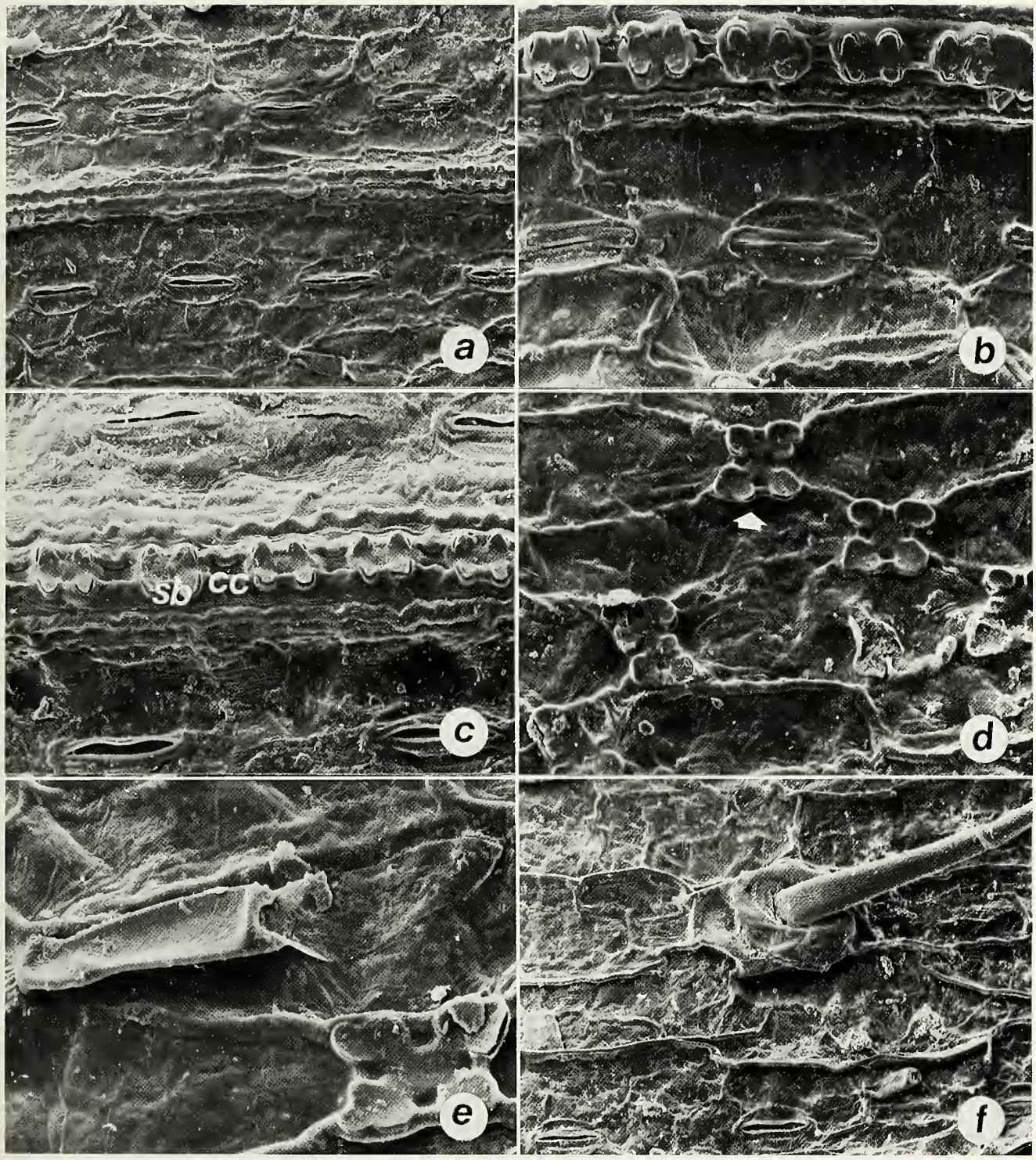

PLATE 108.—Adaxial epidermis *Ichnanthus vicinus*, Adams 807: *a*, overview, interstomatal cells, long cells, ×320; *b*, stomata, interstomatal cells, ×640; *c*, costal silica bodies (sb), cork cells (cc), ×640; *d*, intercostal silica bodies (arrow), ×640; *e*, microhair, ×1250; *f*, base of macrohair, ×320.

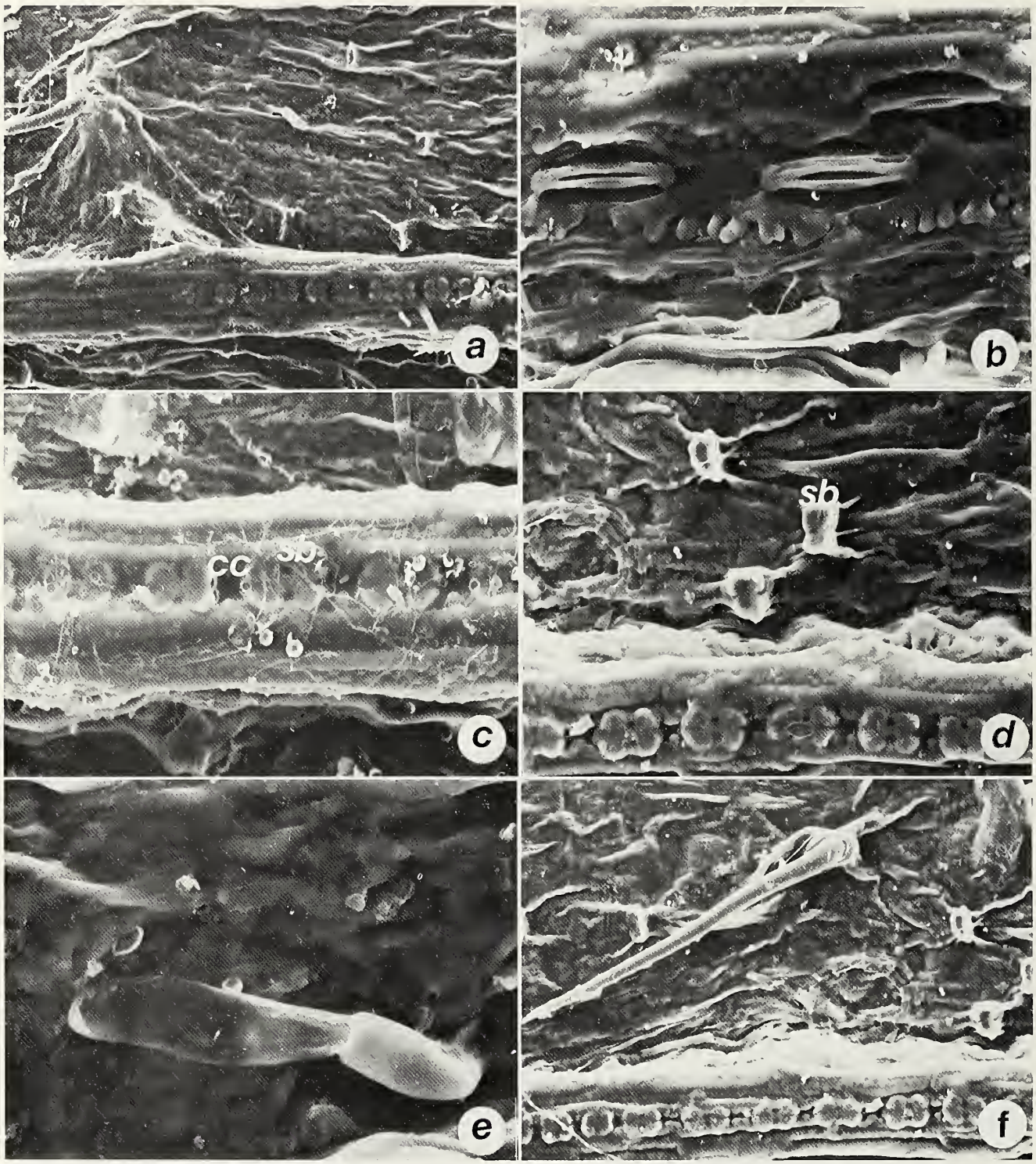

PLATE 109.—Abaxial epidermis *Microcalamus barbinodis,* Brenan 9442: *a,* overview, long cells, ×264; *b,* stomata, interstomatal cells, ×704; *c,* costal silica bodies (sb), cork cells (cc), ×704; *d,* intercostal silica bodies (sb), ×526; *e,* microhair, ×1375; *f,* macrohair, ×352.

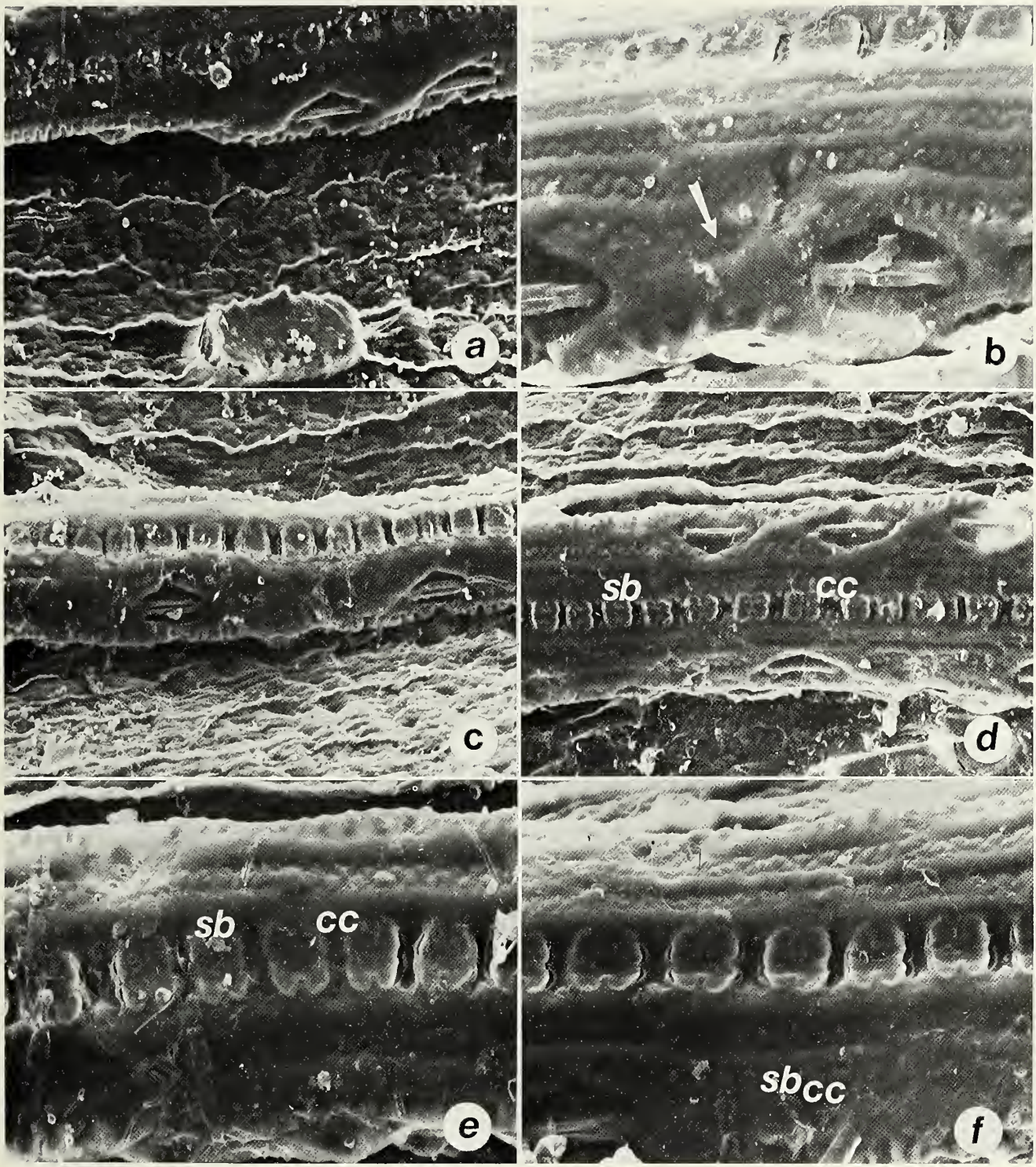

PLATE 110.—Adaxial epidermis *Microcalamus barbinodis*, Brenan 9442: *a*, overview, long cells, ×384; *b*, stomata, interstomatal cell (arrow), ×768; *c*, interstomatal cells, long cells, ×384; *d*, costal silica bodies (sb), cork cells (cc), ×384; *e*, costal silica bodies (sb), cork cells (cc), ×704; *f*, intercostal silica body (sb), cork cell (cc), ×768.

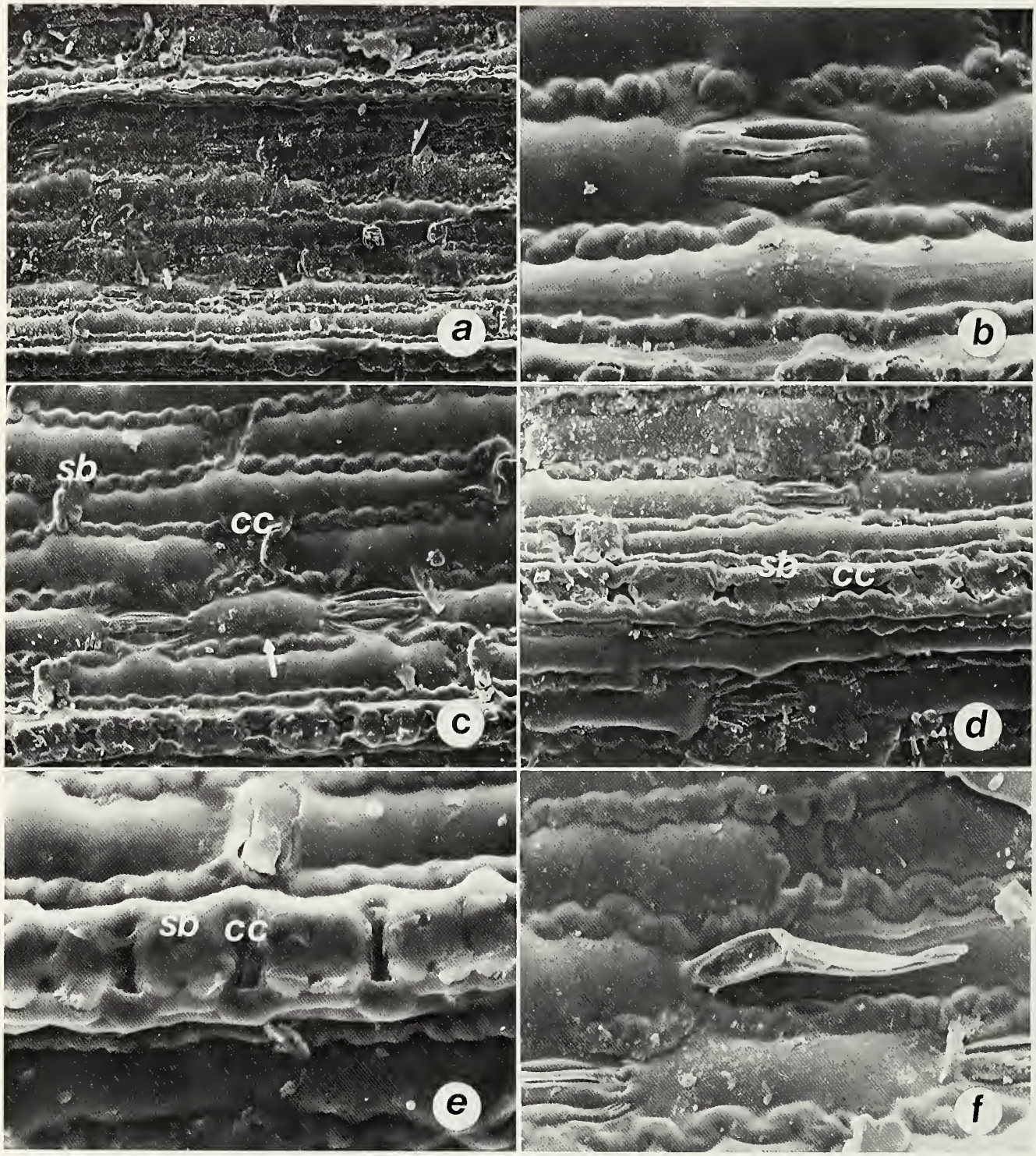

PLATE 111.—Abaxial epidermis *Paratheria prostrata,* Jordan 282: *a,* overview, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cell (arrow), intercostal cork cells (cc), silica bodies (sb), long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), ×320; *e,* costal silica bodies (sb), cork cells (cc), ×1250; *f,* microhair, ×1250.

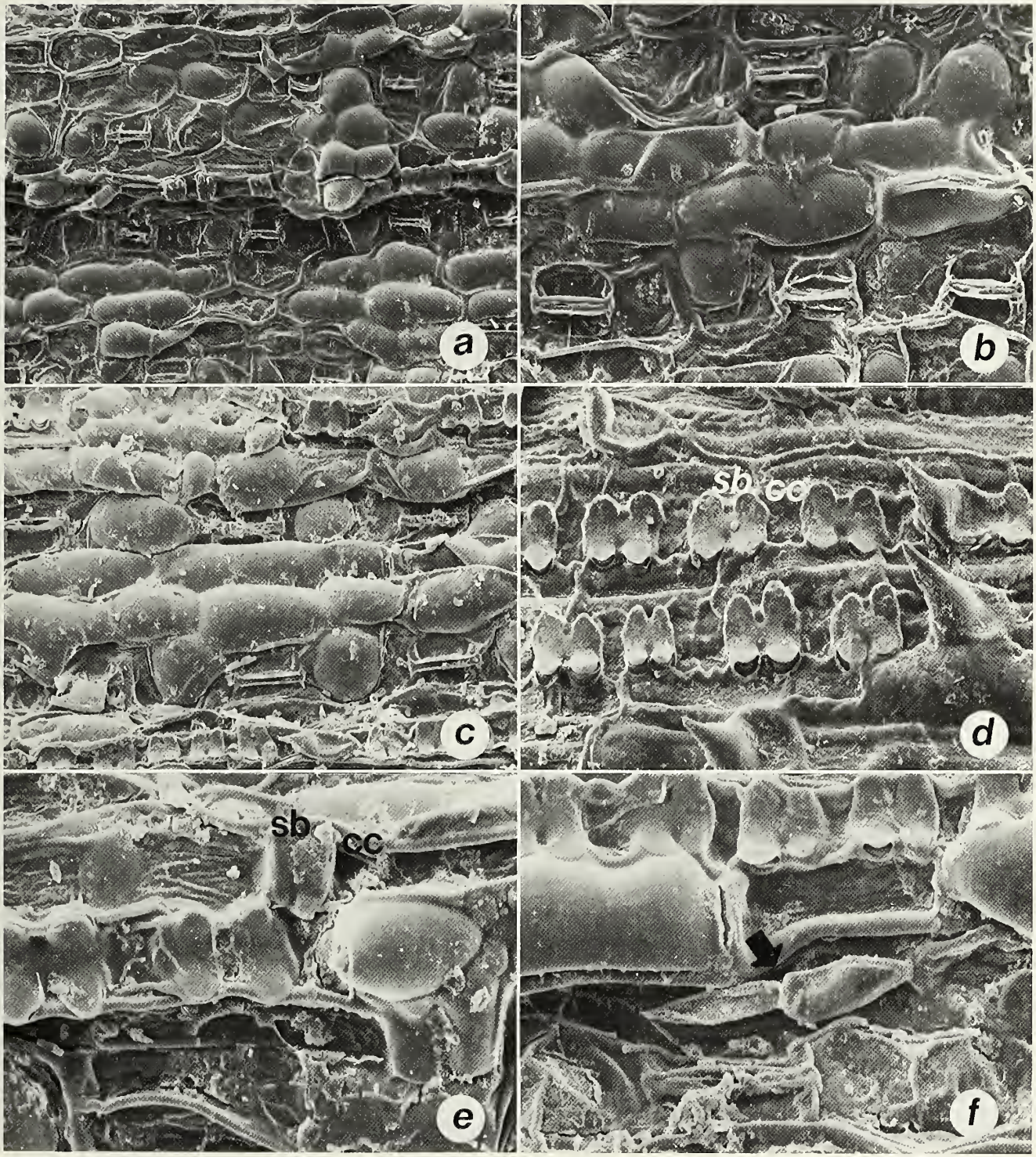

PLATE 112.—Adaxial epidermis *Paratheria prostrata*, Jordan 282: *a*, overview, long cells, ×320; *b*, stomata, interstomatal cells, ×640; *c*, long cells, interstomatal cells, ×480; *d*, costal silica bodies (sb), cork cells (cc), prickles, ×640; *e*, intercostal silica body (sb), cork cell (cc), ×1250; *f*, microhair (arrow), ×1250.

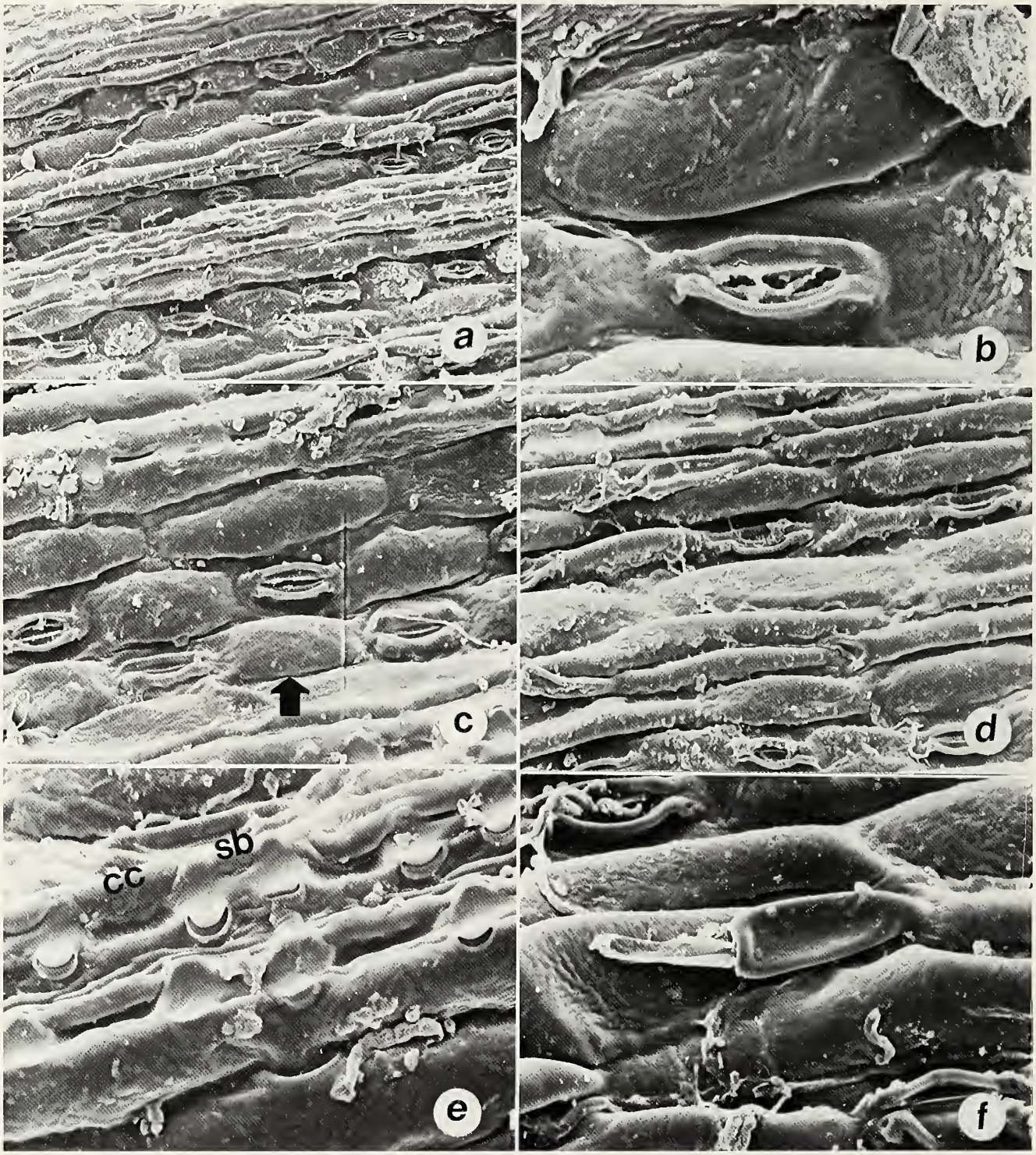

PLATE 113.—Abaxial epidermis *Anadelphia trispiculata,* Thorold 300: *a,* overview, long cells, ×320; *b,* stoma, ×1250; *c,* interstomatal cells (arrow), long cells, ×640; *d,* interstomatal cells, long cells, ×640; *e,* costal silica bodies (sb), cork cells (cc), ×1250; *f,* microhair, ×1250.

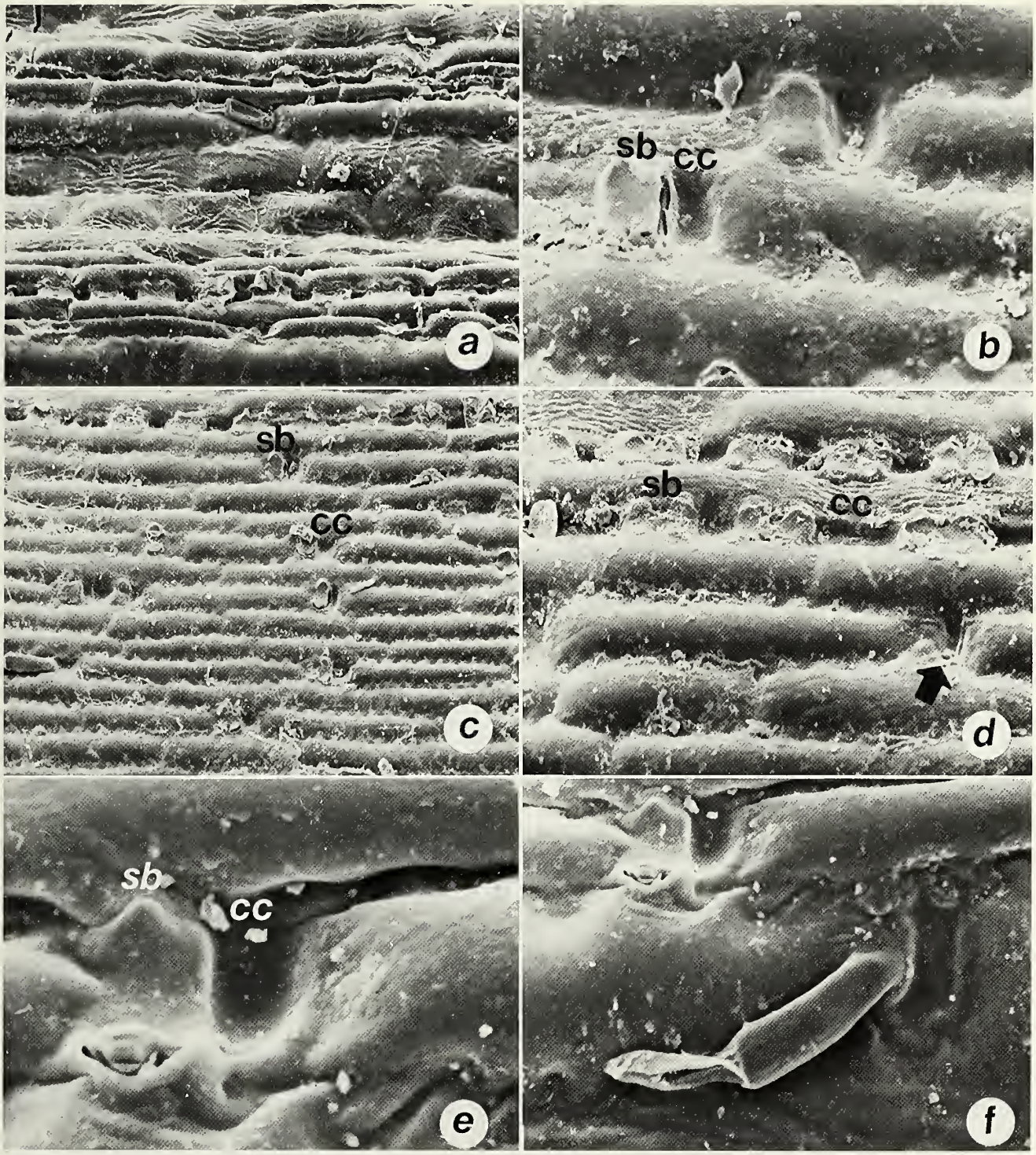

PLATE 114.—Adaxial epidermis *Anadelphia trispiculata,* Thorold 300: *a,* overview, long cells, ×320; *b,* costal silica bodies (sb), cork cells (cc), ×1250; *c,* midvein: long cells, silica bodies (sb), cork cells (cc), ×320; *d,* costal silica bodies (sb), cork cells (cc), intercostal cork cell (arrow), ×640; *e,* intercostal silica body (sb), cork cell (cc), ×2500; *f,* microhair, ×1250.

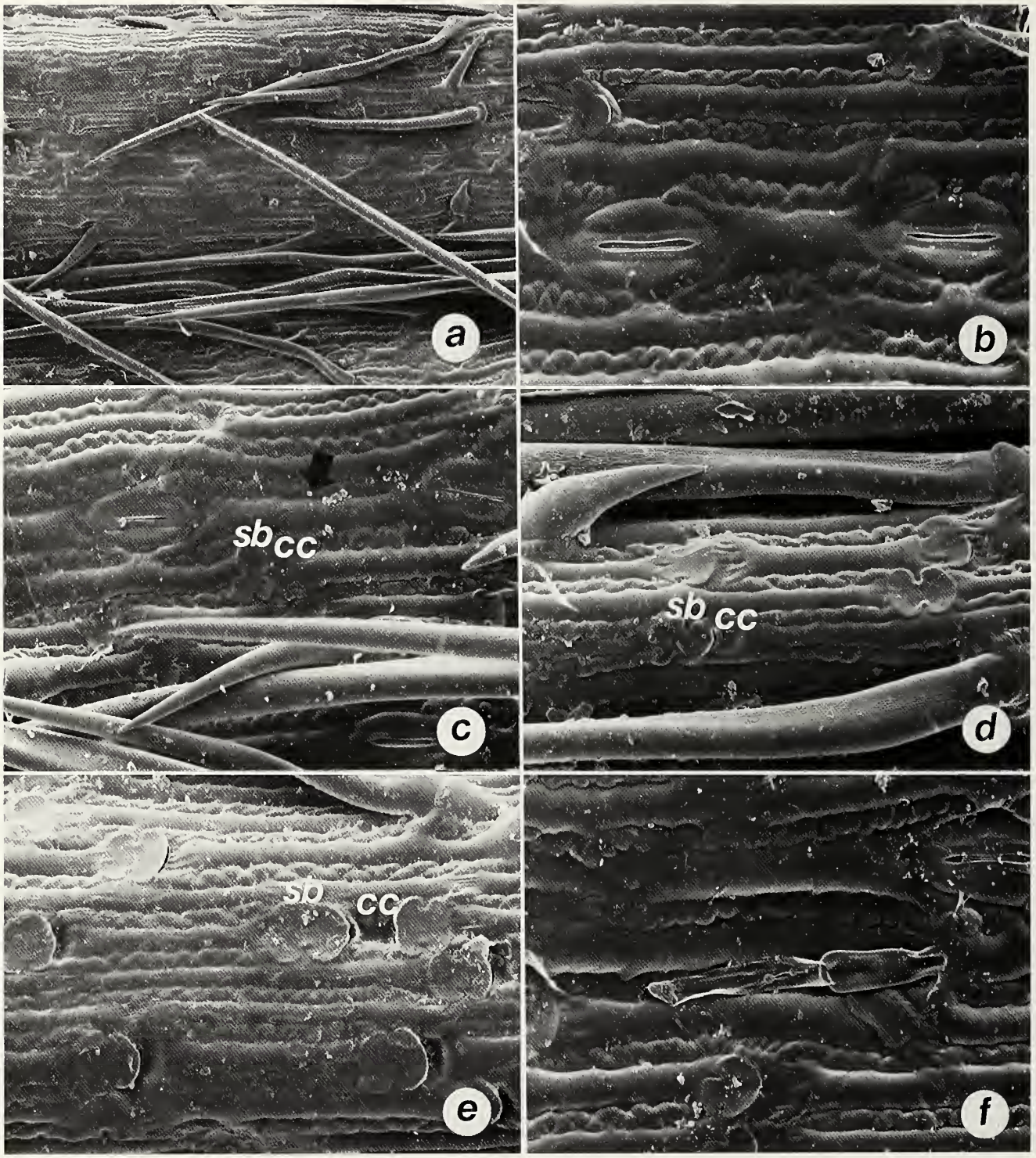

PLATE 115.—Abaxial epidermis *Lasiurus hirsutus*, Rossetti 194: *a*, overview, long cells, macrohairs, ×160; *b*, stomata, interstomatal cell, ×640; *c*, interstomatal cell (arrow), intercostal silica bodies (sb), cork cells (cc), ×480; *d*, costal silica bodies (sb), cork cells (cc), base of macrohair, ×640; *e*, costal silica bodies (sb), cork cells (cc), ×640; *f*, microhair, ×640.

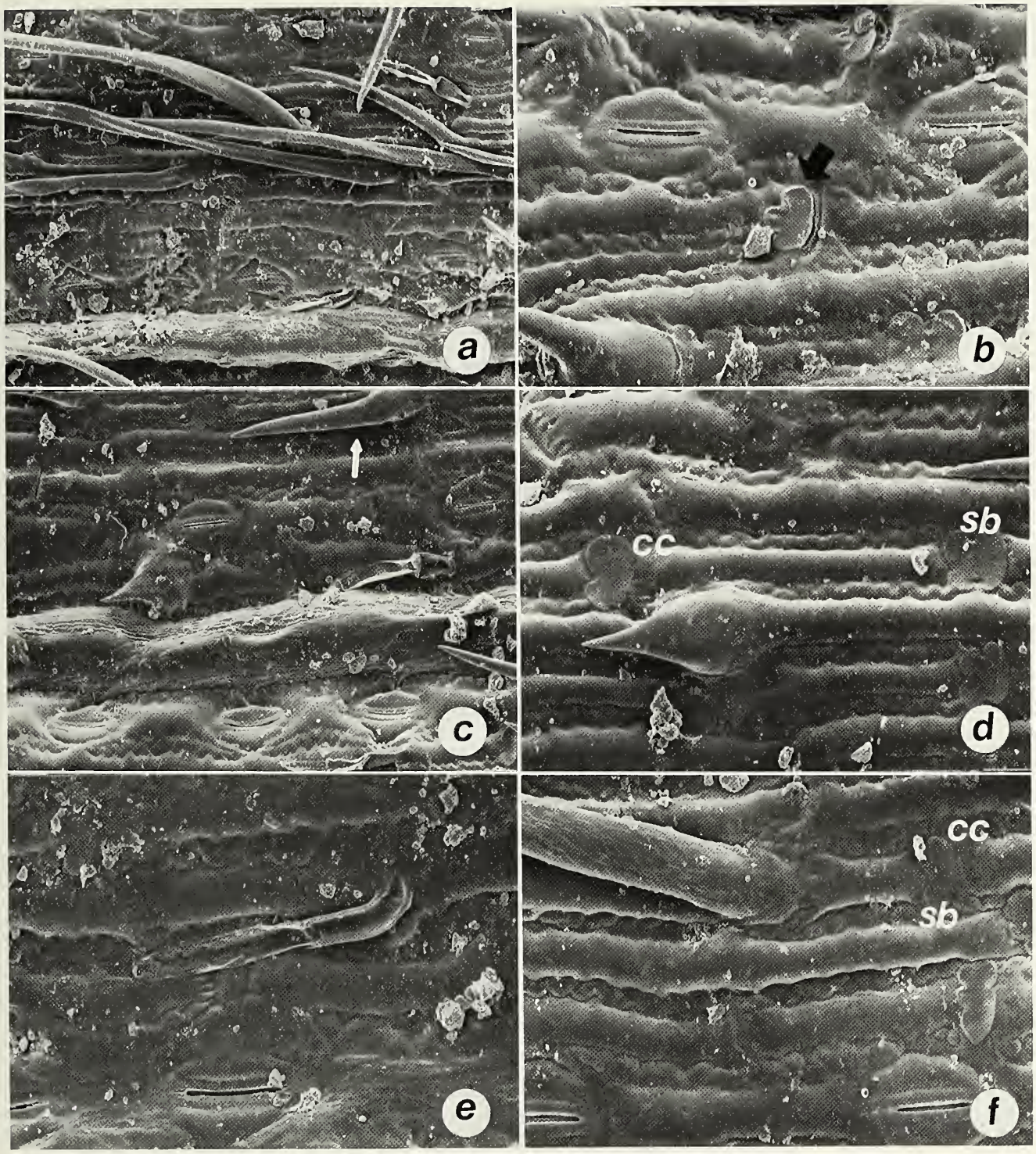

PLATE 116.—Adaxial epidermis *Lasiurus hirsutus*, Rossetti 194: *a*, overview, macrohairs, ×240; *b*, stomata, interstomatal cell, intercostal silica bodies (arrow), ×640; *c*, interstomatal cell, long cells, prickle, short macrohair-type prickles (arrow), ×320; *d*, costal silica bodies (sb), cork cells (cc), prickle, ×640; *e*, microhair, ×640; *f*, base of macrohair, intercostal silica bodies (sb), cork cell (cc), ×640.

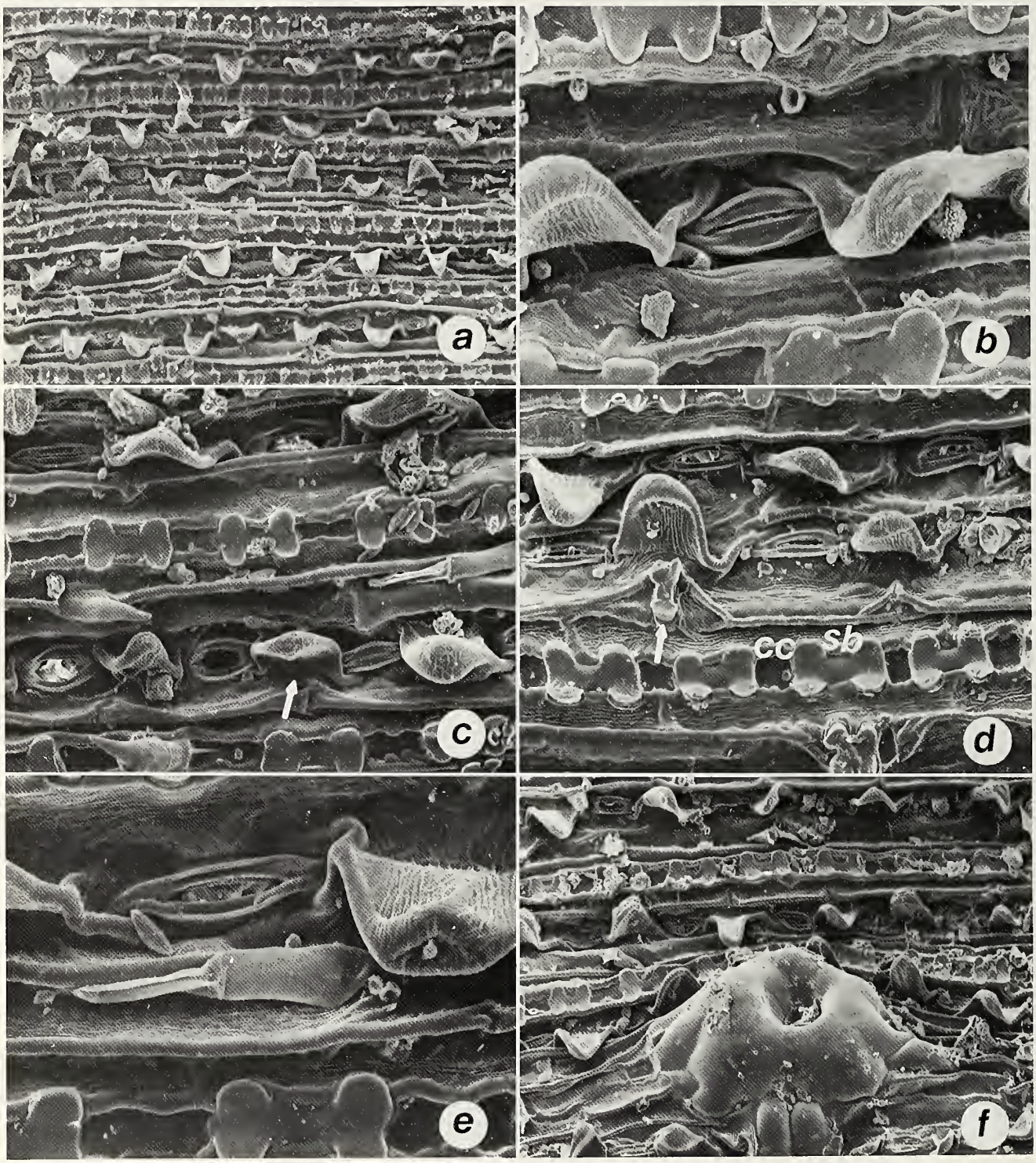

PLATE 117.—Abaxial epidermis *Parahyparrhenia annua,* Behrhaut 3199: *a,* overview, long cells, ×240; *b,* stoma, interstomatal cell, ×1250; *c,* interstomatal cells (arrow), prickles, long cells, ×640; *d,* costal silica bodies (sb), cork cells (cc), intercostal silica bodies (arrow), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

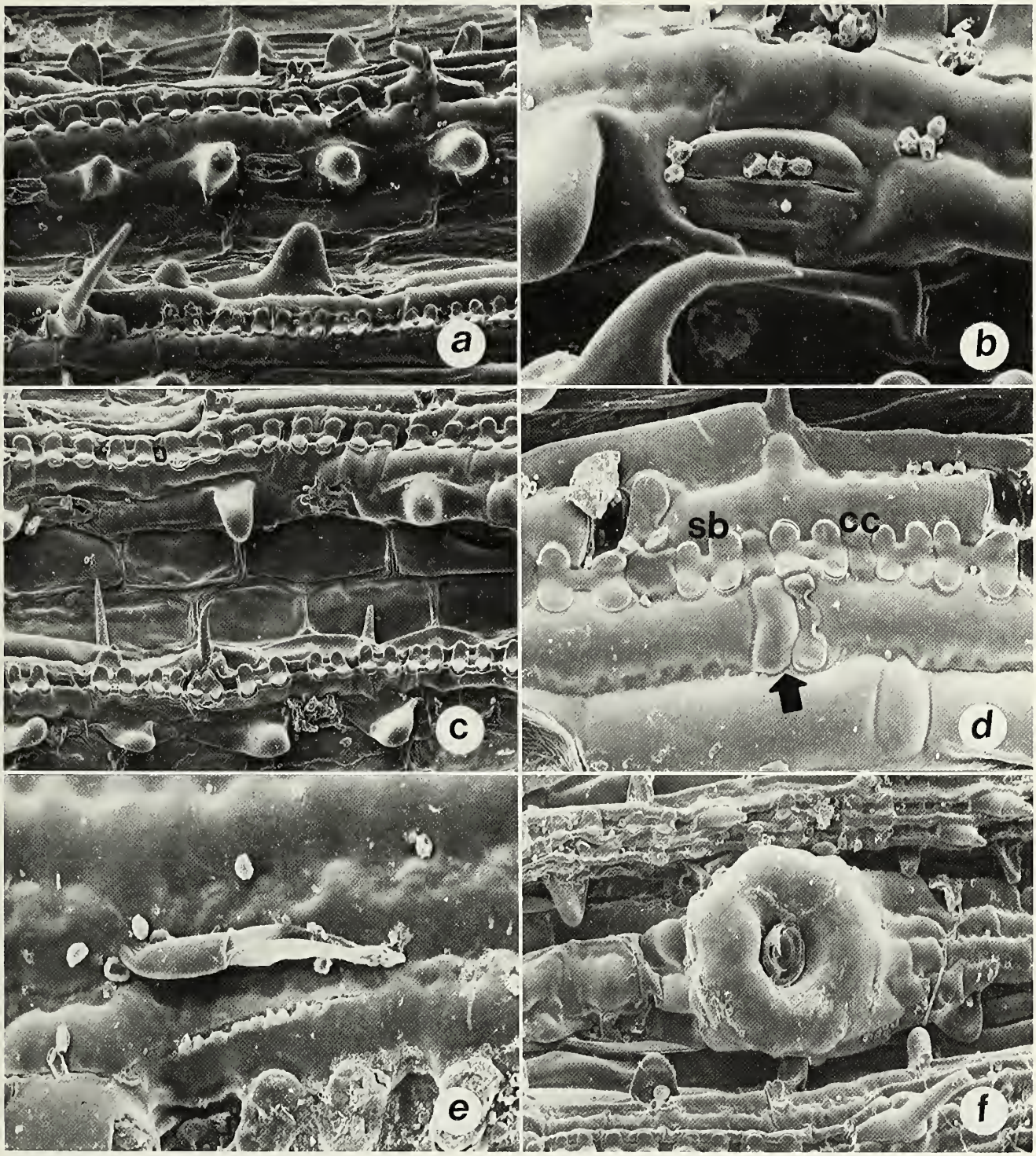

PLATE 118.—Adaxial epidermis *Parahyparrhenia annua,* Behrhaut 3199: *a,* overview, interstomatal cells, prickles, ×320; *b,* stoma, ×1250; *c,* long cells, prickles, ×320; *d,* costal silica bodies (sb), cork cells (cc), intercostal silica bodies and cork cells (arrow), ×640; *e,* microhair, ×1250; *f,* base of macrohair, ×320.

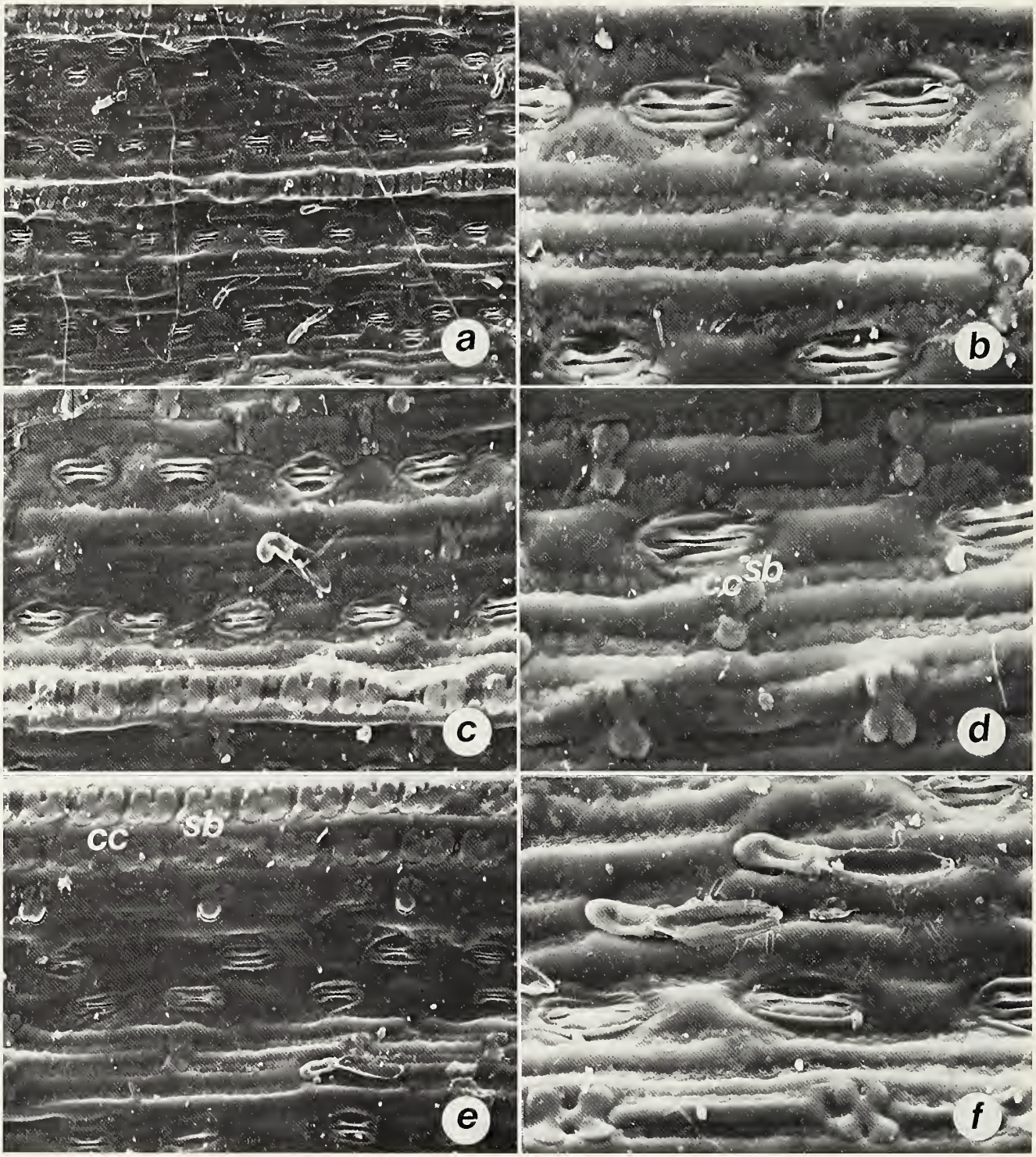

PLATE 119.—Abaxial epidermis *Robynsiochloa purpurascens*, Fay 6154: *a*, overview, long cells, ×160; *b*, stomata, interstomatal cells, ×640; *c*, interstomatal cells, long cells, ×320; *d*, intercostal silica bodies (sb), cork cells (cc), ×640; *e*, costal silica bodies (sb), cork cells (cc), ×320; *f*, microhairs, ×640.

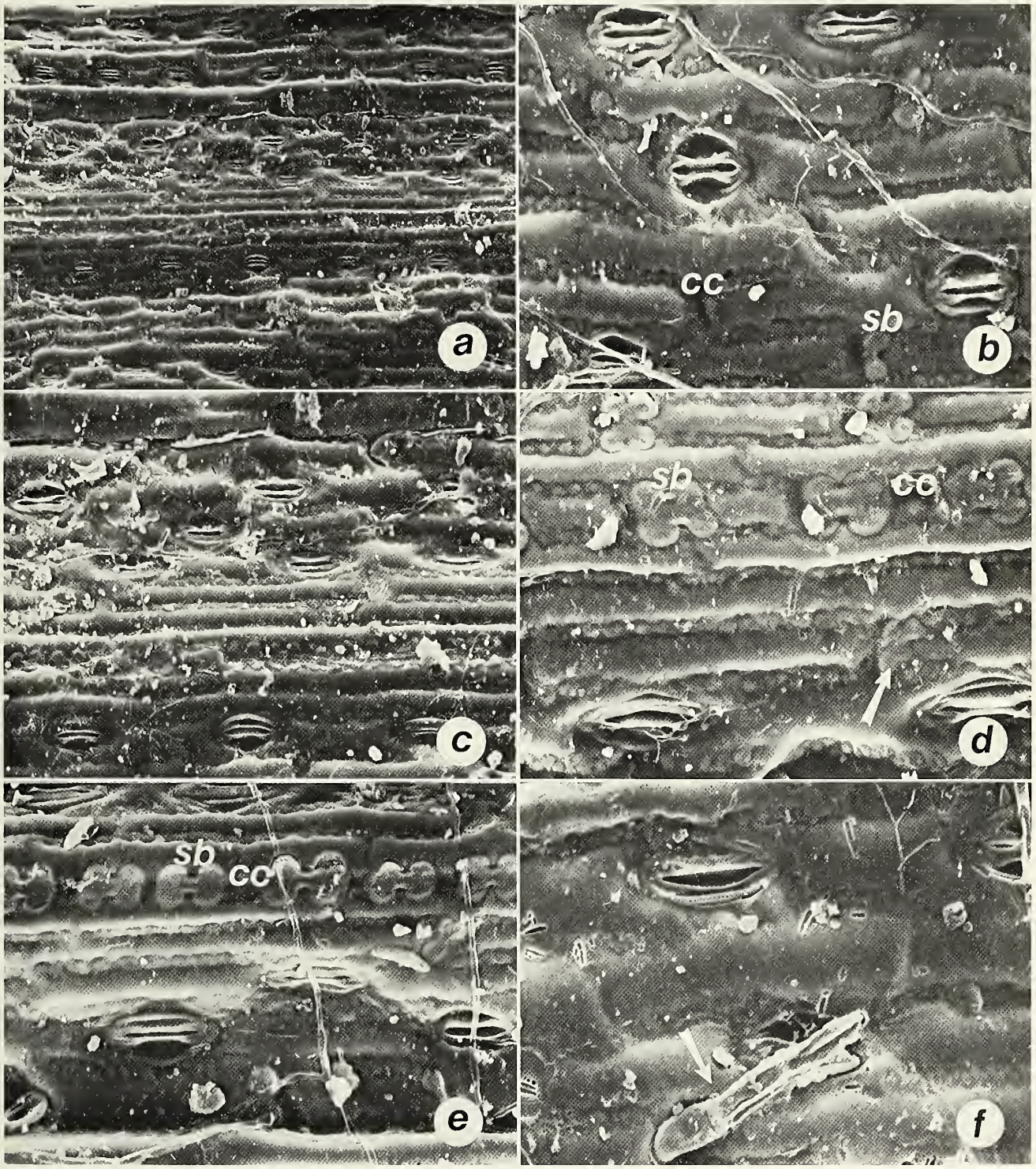

PLATE 120.—Adaxial epidermis *Robynsiochloa purpurascens,* Fay 6154: *a,* overview, long cells, ×160; *b,* stomata, interstomatal cells, intercostal silica bodies (sb), cork cells (cc), ×480; *c,* interstomatal cells, long cells, ×320; *d,* costal silica bodies (sb), cork cells (cc), intercostal silica bodies (arrow), ×640; *e,* costal silica bodies (sb), cork cells (cc), ×480; *f,* microhair (arrow), ×640.

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